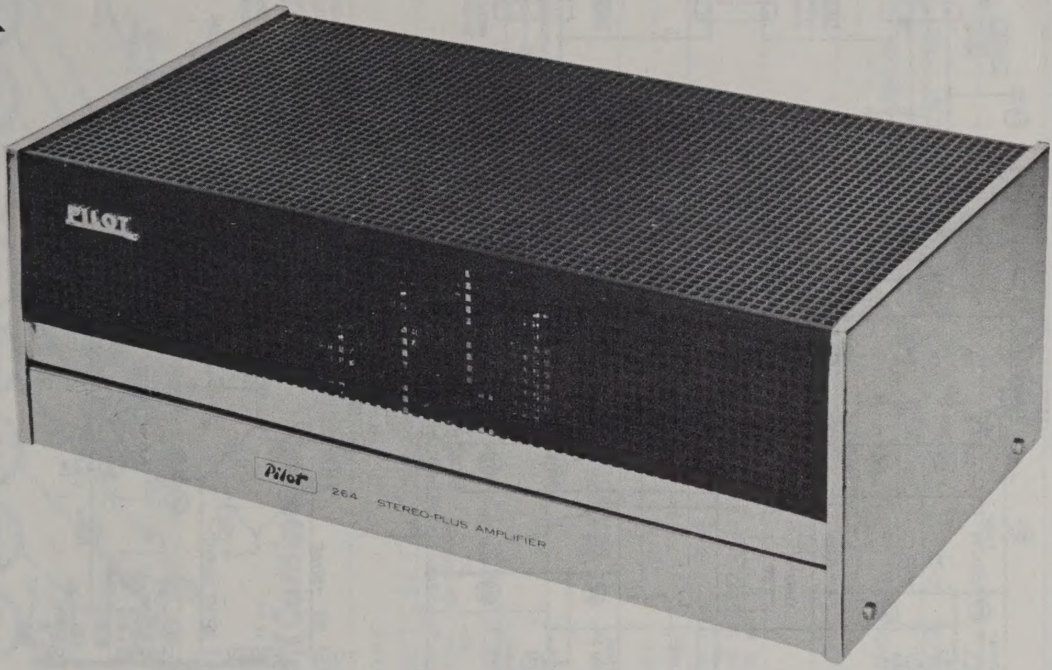
PHOTOFACT® Folder

PILOT
MODEL 264



TRADE NAME	Pilot Model 264		
MANUFACTURER	Pilot Radio Corp., 37-06 36th Street, Long Island City 1, N. Y.		
TYPE SET	AC Operated 8 Tube Stereo Amplifier		
POWER SUPPLY	105 — 120 Volts AC, 60 Cycles	RATING	125 Watts, 1.3 Amp. @117 Volts AC

ADJUSTMENTS

	SPECIAL INSTRUCTIONS	INDICATOR	ADJUST	REMARKS
	DC BALANCE ADJUSTMENTS			
1.	Remove 5 -pin shorting plug from test socket. Remove Lock nuts from Bias and DC Balance Controls.	DC voltmeter between pins 3 and 4 of test socket.	Channel B DC Balance (R5)	Adjust for zero volts on Voltmeter.
2.	"	DC Voltmeter between pins 1 and 2 of test socket.	Channel A DC Balance (R2)	"
	BIAS ADJUSTMENTS			
3.	"	Positive lead of Voltmeter to pin 3 of test socket, common to chassis.	Channel B Bias (R4)	Adjust for .82 volts DC on Voltmeter.
4.	"	Positive lead of Voltmeter to pin 1 of test socket, common to chassis.	Channel A Bias (R1)	"
	AC BALANCE ADJUSTMENTS	(USE EQUIPMENT WITH MINIMUM RESIDUAL DISTORTION)		
5.	Repeat Steps 1 thru 4. Connect the correct load to the output transformers. Connect signal generator to amplifier input.	Intermodulation Distortion Analyzer across terminals "4" and "0" of output transformer.	AC Balance Controls	Adjust for minimum distortion at full amplifier output with generator adjusted for 1000∿ and 1500∿. Repeat procedure for both channels.

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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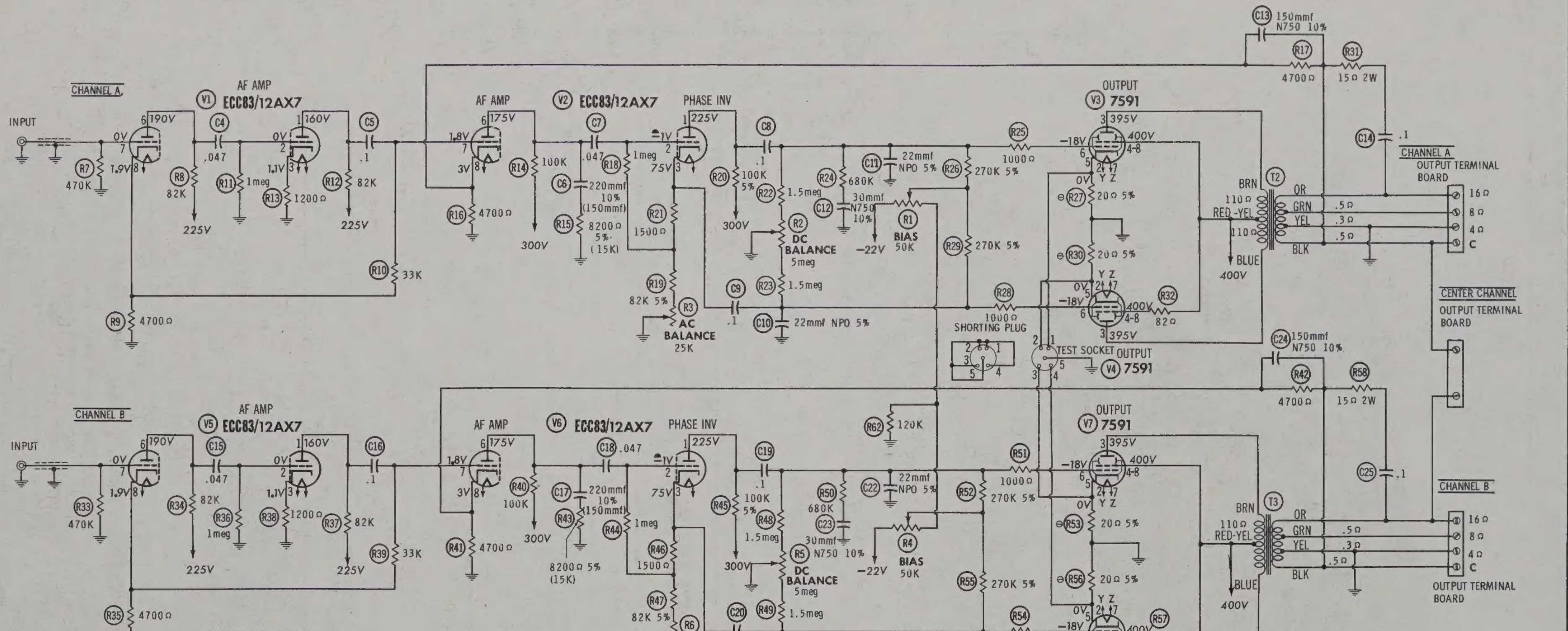

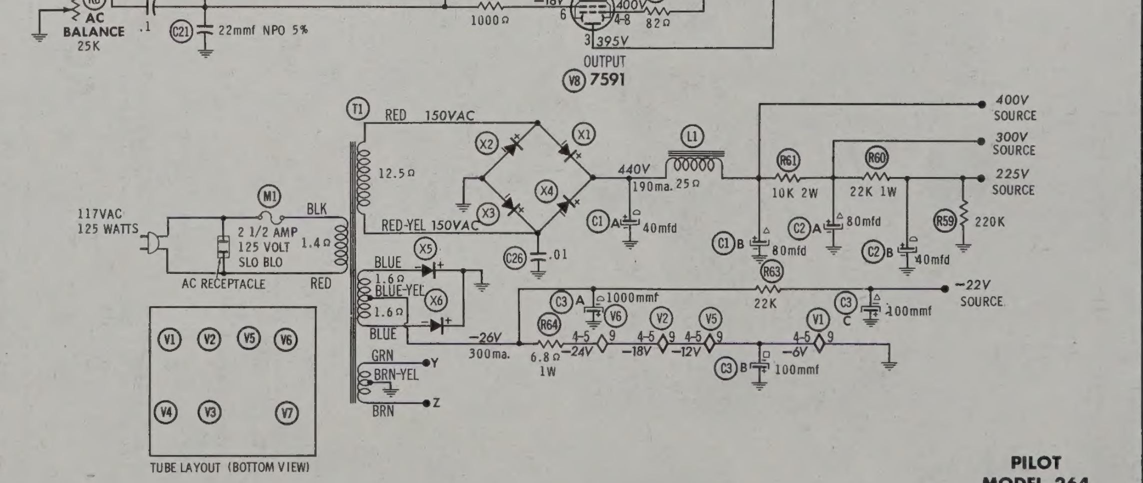

RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	ECC83 12AX7	†115K	1meg	1200Ω	5Ω	5Ω	†115K	470K	4700Ω	0Ω
V2	ECC83 12AX7	†110K	1.1meg	100K	15Ω	15Ω	†110K	38K	2400Ω	10Ω
V3	7591	NC	FIL	†135Ω	†25Ω	0Ω	290K	FIL	†25Ω	
V4	7591	TP	FIL	†135Ω	†110Ω	0Ω	290K	FIL	†110Ω	
V5	ECC83 12AX7	†115K	1meg	1200Ω	10Ω	10Ω	†115K	470K	4700Ω	5Ω
V6	ECC83 12AX7	†110K	1.1meg	100K	20Ω	20Ω	†110K	38K	2400Ω	15Ω
V7	7591	NC	FIL	†135Ω	†25Ω	0Ω	290K	FIL	†25Ω	
V8	7591	NC	FIL	†135Ω	†110Ω	0Ω	290K	FIL	†110Ω	

† MEASURED FROM OUTPUT OF X1.
▲ MEASURED FROM CATHODE.

NC NO CONNECTION
TP TIE POINT

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured with 1000 ohm per volt voltmeter.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common ground.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance of component values makes possible a variation of ±15% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

⊖ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

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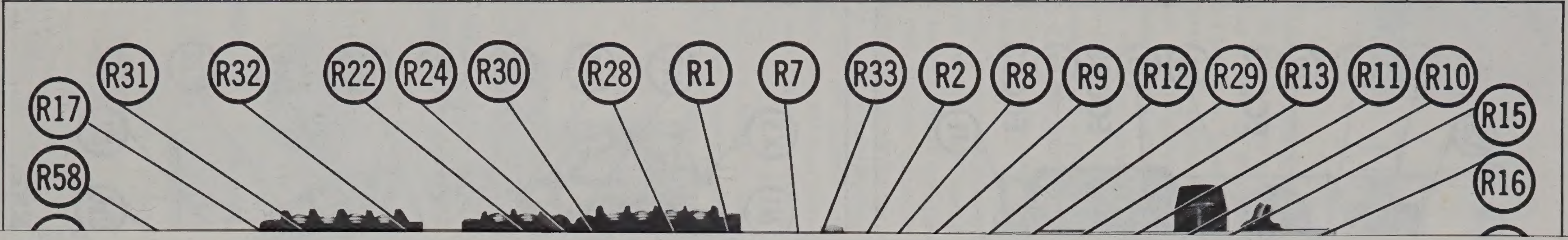
PILOT
MODEL 264



PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REPLACEMENT DATA IRC PART No.	WORKMAN PART No.	REMARKS
R7	470K			
R8	82K			
R9	4700Ω			
R10	33K			
R11	1meg			
R12	82K			
R13	1200Ω			
R14	100K			
R15	8200Ω 5%			(15K)*
R16	4700Ω			
R17	4700Ω			
R18	1meg			
R19	82K 5%			
R20	100K 5%			
R21	1500Ω			
R22	1.5meg			
R23	1.5meg			
R24	680K			
R25	1000Ω			
R26	270K 5%			
R27	20Ω 5%			Note 1
R28	1000Ω			
R29	270K 5%			
R30	20Ω 5%			Note 1
R31	15Ω 2W			
R32	82Ω			
R33	470K			
R34	82K			
R35	4700Ω			

ITEM No.	RATING	REPLACEMENT DATA IRC PART No.	WORKMAN PART No.	REMARKS
R36	1meg			
R37	82K			
R38	1200Ω			
R39	33K			
R40	100K			
R41	4700Ω			
R42	4700Ω			
R43	8200Ω 5%			(15K)*
R44	1meg			
R45	100K 5%			
R46	1500Ω			
R47	82K 5%			
R48	1.5meg			
R49	1.5meg			
R50	680K			
R51	1000Ω			
R52	270K 5%			
R53	20Ω 5%			Note 2
R54	1000Ω			
R55	270K 5%			
R56	20Ω 5%			Note 2
R57	82Ω			
R58	15Ω 2W			
R59	220K			
R60	22K 1W			
R61	10K 2W			
R62	120K			
R63	22K			
R64	6.8Ω 1W			

Note 1. R27 and R30 are matched to 1%.
Note 2. R53 and R56 are matched to 1%.
* Alternate Value.

FILTER CHOKE

ITEM No.	RATINGS CURRENT (Measured)	DC RES.	INDUCTANCE (0 CURRENT 1000 ∿)	REPLACEMENT DATA PILOT PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
L1	.190A	25Ω	250MH	57-18					

TRANSFORMER (POWER)

ITEM No.	RATING PRI.	SEC. 1	SEC. 2	REPLACEMENT DATA PILOT PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T1	117V @ 1.3A	300V @ .400A AC	420VCT @ .300A DC	55-79					
	SEC. 3	SEC. 4	SEC. 5						
	6.3VCT @ 3.5A								

TRANSFORMER (AUDIO OUTPUT)

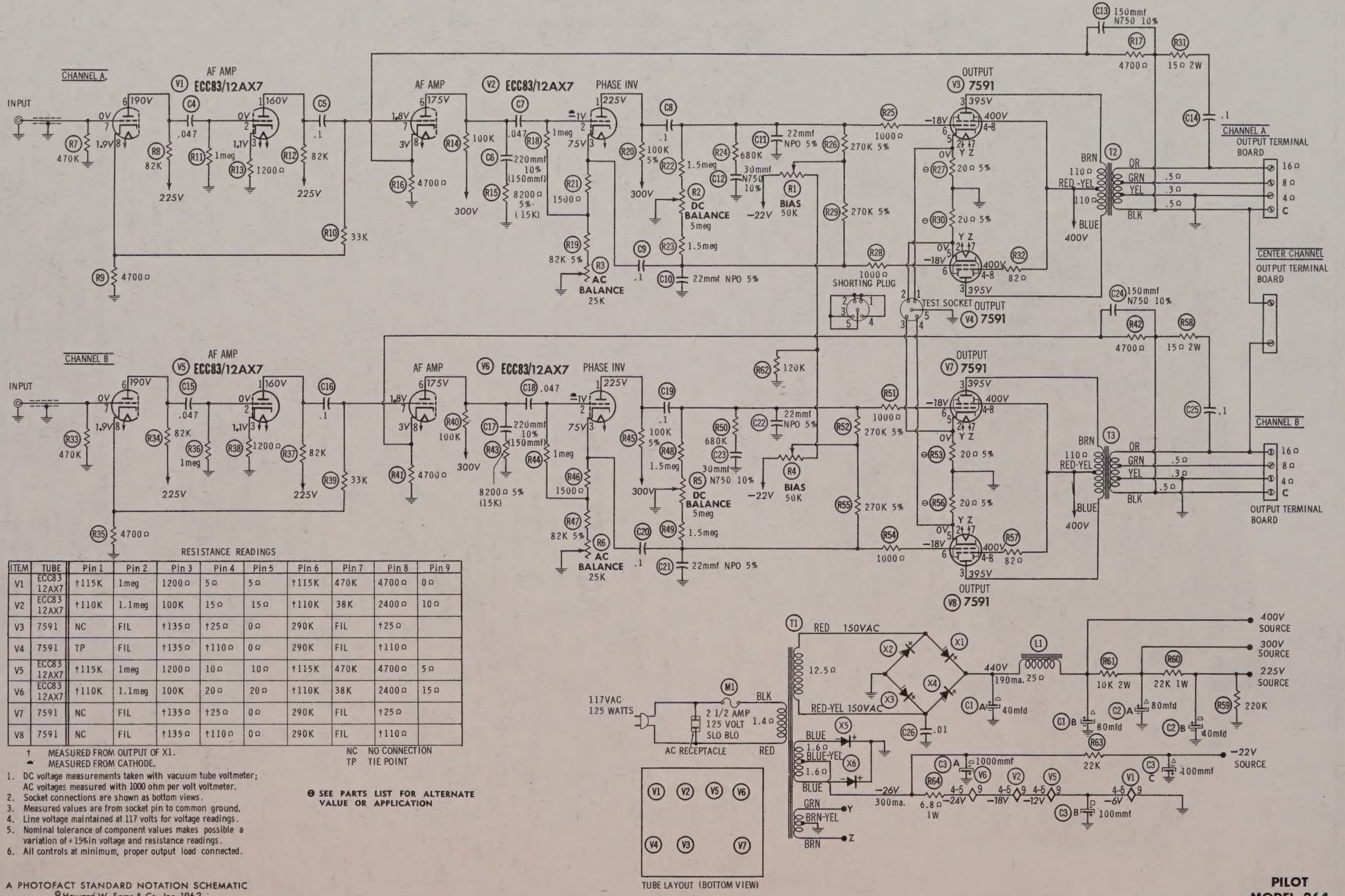
ITEM No.	IMPEDANCE PRI.	SEC.	REPLACEMENT DATA PILOT PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T2	5400Ω CT	16Ω Tap @ 8Ω, 4Ω	56-63					
T3	5400Ω CT	16Ω Tap @ 8Ω, 4Ω	56-63					

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA PILOT PART No. FUSE	PILOT HOLDER	LITTELFUSE PART No. FUSE	LITTELFUSE HOLDER	BUSS PART No. FUSE	BUSS HOLDER
M1	3AG	2½A 125V S/B	111-12		31302.5 (3AG 2½A 125V) S/B	342001	MDL 2½	HKP

WIRING DATA

General-use Unshielded Hook-up Wire .... Use BELDEN No. 8530 (Solid) Available in 12 Colors
8524 (Stranded) Available in 12 Colors
Power Cord .... Use BELDEN No. 17106 (Plastic) or 17126 (Rubber) - 6 Ft.
17109 (Plastic) or 17129 (Rubber) - 9 Ft.
Power Cord (Interlock Type) .... Use BELDEN No. 8874 (Rubber) or 8895 (Plastic)
Low-Loss Shielded Lead (Interconnecting) .... Use BELDEN No. 8401 or 8421
Phono Pick-up Arm Cable .... Use BELDEN No. 8430 (Two Conductor-Unshielded)
8429 (Two Conductor-Shielded)
8419 (Three Conductor-Shielded)



RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	ECC83 12AX7	†115K	1meg	1200Ω	5Ω	5Ω	†115K	470K	4700Ω	0Ω
V2	ECC83 12AX7	†110K	1.1meg	100K	15Ω	15Ω	†110K	38K	2400Ω	10Ω
V3	7591	NC	FIL	†135Ω	†25Ω	0Ω	290K	FIL	†25Ω	
V4	7591	TP	FIL	†135Ω	†110Ω	0Ω	290K	FIL	†110Ω	
V5	ECC83 12AX7	†115K	1meg	1200Ω	10Ω	10Ω	†115K	470K	4700Ω	5Ω
V6	ECC83 12AX7	†110K	1.1meg	100K	20Ω	20Ω	†110K	38K	2400Ω	15Ω
V7	7591	NC	FIL	†135Ω	†25Ω	0Ω	290K	FIL	†25Ω	
V8	7591	NC	FIL	†135Ω	†110Ω	0Ω	290K	FIL	†110Ω	

† MEASURED FROM OUTPUT OF X1.
▬ MEASURED FROM CATHODE.

NC NO CONNECTION
TP TIE POINT

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured with 1000 ohm per volt voltmeter.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common ground.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance of component values makes possible a variation of ±15% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

⊖ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

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PILOT
MODEL 264

PARTS LIST AND DESCRIPTIONS

TUBES

• GENERAL ELECTRIC • RAYTHEON • SYLVANIA •

ITEM No.	USE	TYPE	ITEM No.	USE	TYPE
V1	Channel A AF Amp.	ECC83/12AX7	V5	Channel B AF Amp.	ECC83/12AX7
V2	Channel A AF Amp. - Phase Inverter	ECC83/12AX7	V6	Channel B AF Amp. - Phase Inverter	ECC83/12AX7
V3	Channel A Output	7591	V7	Channel B Output	7591
V4	Channel A Output	7591	V8	Channel B Output	7591

POWER RECTIFIERS & SIGNAL DIODES

ITEM No.	CURRENT RATING (Measured)	ORIGINAL Part or Type No.	RECTIFIERS		DIODES		NOTES
			RCA PART No.	SARKES TARZIAN PART No.	GENERAL ELECTRIC PART No.	RAYTHEON PART No.	
X1	.190A	110-635	1N1763	F6			
X2	.190A	110-635	1N1763	F6			
X3	.190A	110-635	1N1763	F6			
X4	.190A	110-635	1N1763	F6			
X5	.300A	110-636	1N1763	F6			Bias Rectifier
X6	.300A	110-636	1N1763	F6			Bias Rectifier

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	PILOT PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	GENERAL ELECTRIC PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.
C1A	◒40	450	24-184	AFH1-55	A0510	XC2-33	FP149	TMS-1800	TVL-1735
B	▲80	450		PRS1750	BR4045		TC78	TD-40-450	TVA-1712
C2A	▲80	450	24-184	AFH1-55	A0510	XC2-33	FP149	TMS-1800	TVL-1735
B	◒40	450		PRS1750	BR4045		TC78	TD-40-450	TVA-1712
C3A	◒1000	35	24-186						
B	■100	35							
C	▲100	35							

FIXED CAPACITORS

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C4	.047 400V		P488N-047	DD-503	CUB4S47	4DP-3-473	GEM-4147	4TM-S47
C5	.1 400V		P488N-1	DF-104	CUB4P1	4DP-3-104	GEM-401	4TM-P10
C6	220 10%	(150) †	DI-220	DD-221	L10T2	CCD-221	GP322	10TS-T22
C7	.047 400V		P488N-047	DD-503	CUB4S47	4DP-3-473	GEM-4147	4TM-S47
C8	.1 400V		P488N-1	DF-104	CUB4P1	4DP-3-104	GEM-401	4TM-P10
C9	.1 400V		P488N-1	DF-104	CUB4P1	4DP-3-104	GEM-401	4TM-P10
C10	22 NPO 5%			DTZ-22	C10Q22C		CNO-422	10TCC-Q22
C11	22 NPO 5%			DTZ-22	C10Q22C		CNO-422	10TCC-Q22
C12	30 N750 10%		N750-DI 33	TCN-30	C10Q3U	CCTN-330	CN7-433	10TCU-Q33
C13	150 N750 10%		N750-DI 150	DTN-150	C10T15U	CCTN-151	CN7-315	10TCU-T15
C14	.1 100V		P288N-1	DF-104	CUB2P1	1DP-2-104	GEM-201	2TM-P10
C15	.047 400V		P488N-047	DD-503	CUB4S47	4DP-3-473	GEM-4147	4TM-S47
C16	.1 400V		P488N-1	DF-104	CUB4P1	4DP-3-104	GEM-401	4TM-P10
C17	220 10%	(150) †	DI-220	DD-221	L10T22	CCD-221	GP322	10TS-T22
C18	.047 400V		P488N-047	DD-503	CUB4S47	4DP-2-473	GEM-4147	4TM-S47
C19	.1 400V		P488N-1	DF-104	CUB4P1	4DP-3-104	GEM-401	4TM-P10
C20	.1 400V		P488N-1	DF-104	CUB4P1	4DP-3-104	GEM-401	4TM-P10
C21	22 NPO 5%			DTZ-22	C10Q22C		CNO-422	10TCC-Q22
C22	22 NPO 5%			DTZ-22	C10Q22C		CNO-422	10TCC-Q22
C23	30 N750 10%		N750-DI 33	TCN-30	C10Q3U	CCTN-330	CN7-433	10TCU-Q33
C24	150 N750 10%		N750-DI 150	DTN-150	C10T15U	CCTN-151	CN7-315	10TCU-T15
C25	.1 100V		P288N-1	DF-104	CUB2P1	1DP-2-104	GEM-201	2TM-P10
C26	.01		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10

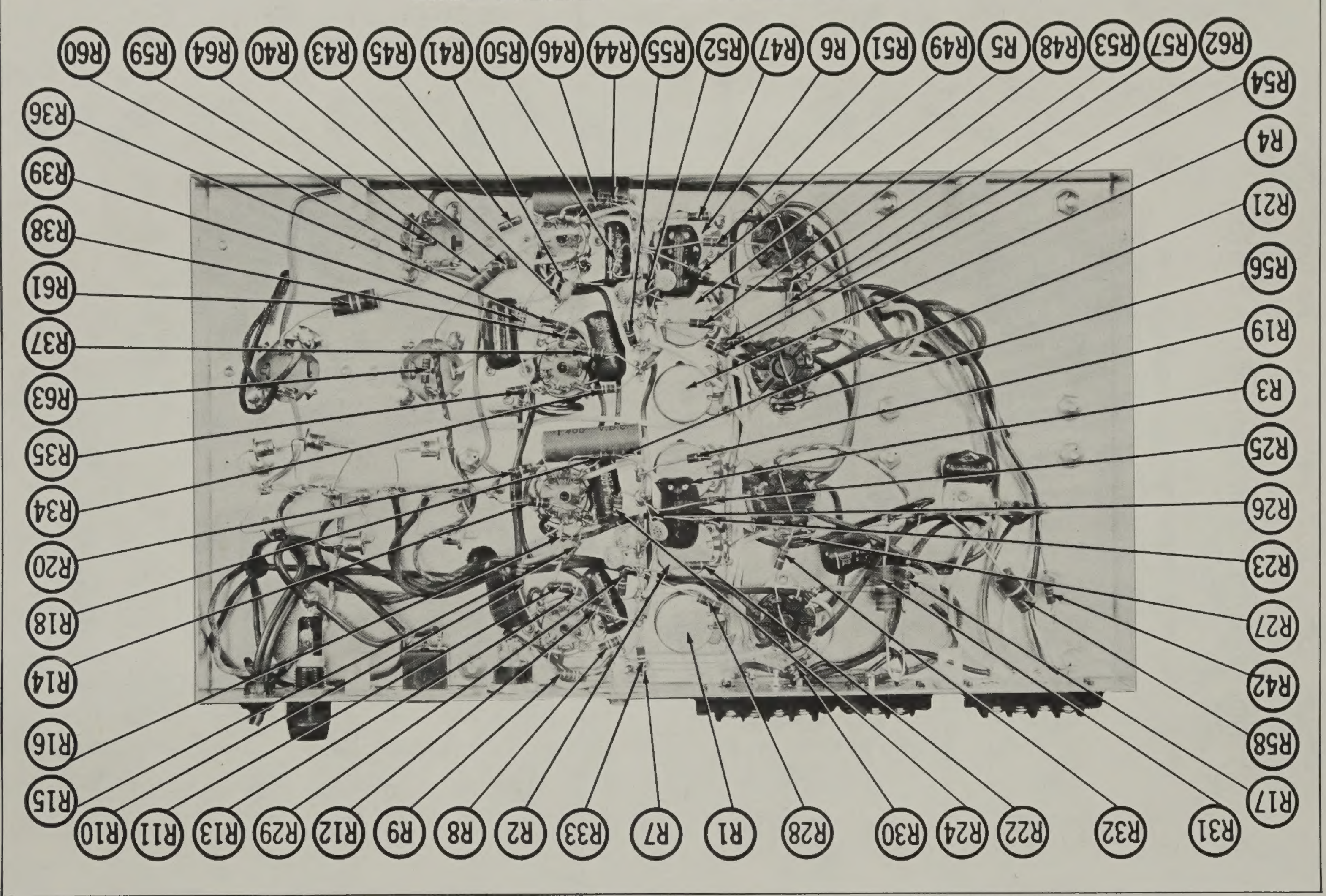
† Alternate Value.

CONTROLS

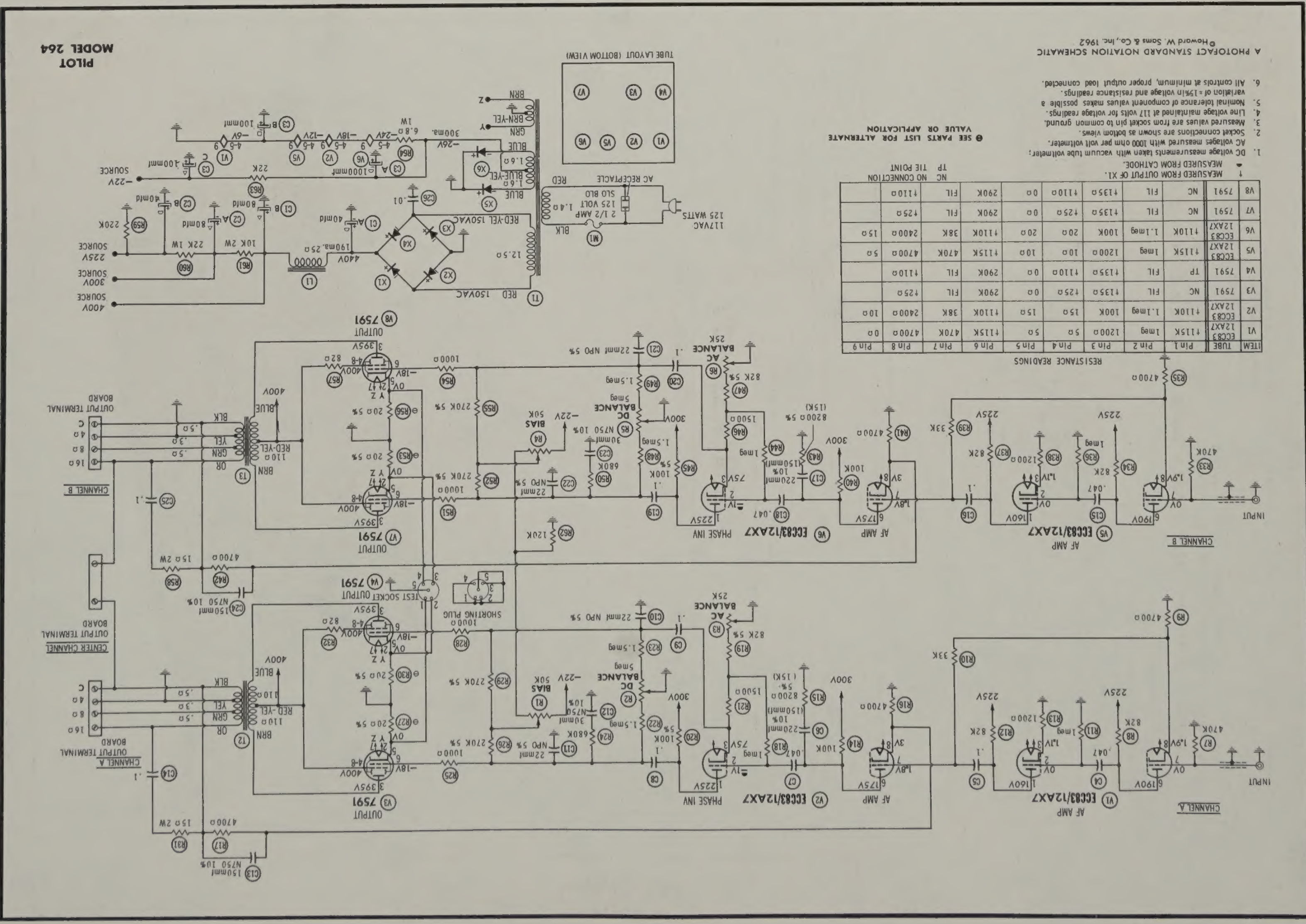
All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	USE	RESIST-ANCE	REPLACEMENT DATA				
			PILOT PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	CTS-IRC PART No.	MALLORY PART No.
R1	Bias Adjust, Ch. A	50K	39-65	B-31, or (AB-31, AK-1)	A47-50K-S/ FKS-1/4	Q11-123, or (BU2, CF12, SS2, DC1)†	U35
R2	DC Balance, Ch. A	5meg	39-66	B-87, or (AB-87, AK-1)	A47-5meg-S/ FKS-1/4	Q11-141, or (BU2, CF22, SS2, DC1)†	U67 or (UA56L)
R3	AC Balance, Ch. A	25K	39-64	B-26, or (AB-26, AK-1)	A47-25K-S/ FKS-1/4	Q11-120, or (BU2, CF11, SS2, DC1)†	U29 or (UA253L)
R4	Bias Adjust, Ch. B	50K	39-65	B-31, or (AB-31, AK-1)	A47-50K-S/ FKS-1/4	Q11-123, or (BU2, CF12, SS2, DC1)†	U35
R5	DC Balance, Ch. B	5meg	39-66	B-87, or (AB-87, AK-1)	A47-5meg-S/ FKS-1/4	Q11-141, or (BU2, CF22, SS2, DC1)†	U67 or (UA56L)
R6	AC Balance, Ch. B	25K	39-64	B-26, or (AB-26, AK-1)	A47-25K-S/ FKS-1/4	Q11-120, or (BU2, CF11, SS2, DC1)†	U29 or (UA253L)

† "SNAPTROL".



CHASSIS BOTTOM VIEW — RESISTOR IDENT.



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V3	7591	NC	FIL	†135Ω	†25Ω	0Ω	290K	FIL	†25Ω	
V4	7591	TP	FIL	†135Ω	†110Ω	0Ω	290K	FIL	†110Ω	
V5	ECC83 12AX7	†115K	1meg	1200Ω	10Ω	10Ω	†115K	470K	4700Ω	5Ω
V6	ECC83 12AX7	†110K	1.1meg	100K	20Ω	20Ω	†110K	38K	2400Ω	15Ω
V7	7591	NC	FIL	†135Ω	†25Ω	0Ω	290K	FIL	†25Ω	
V8	7591	NC	FIL	†135Ω	†110Ω	0Ω	290K	FIL	†110Ω	

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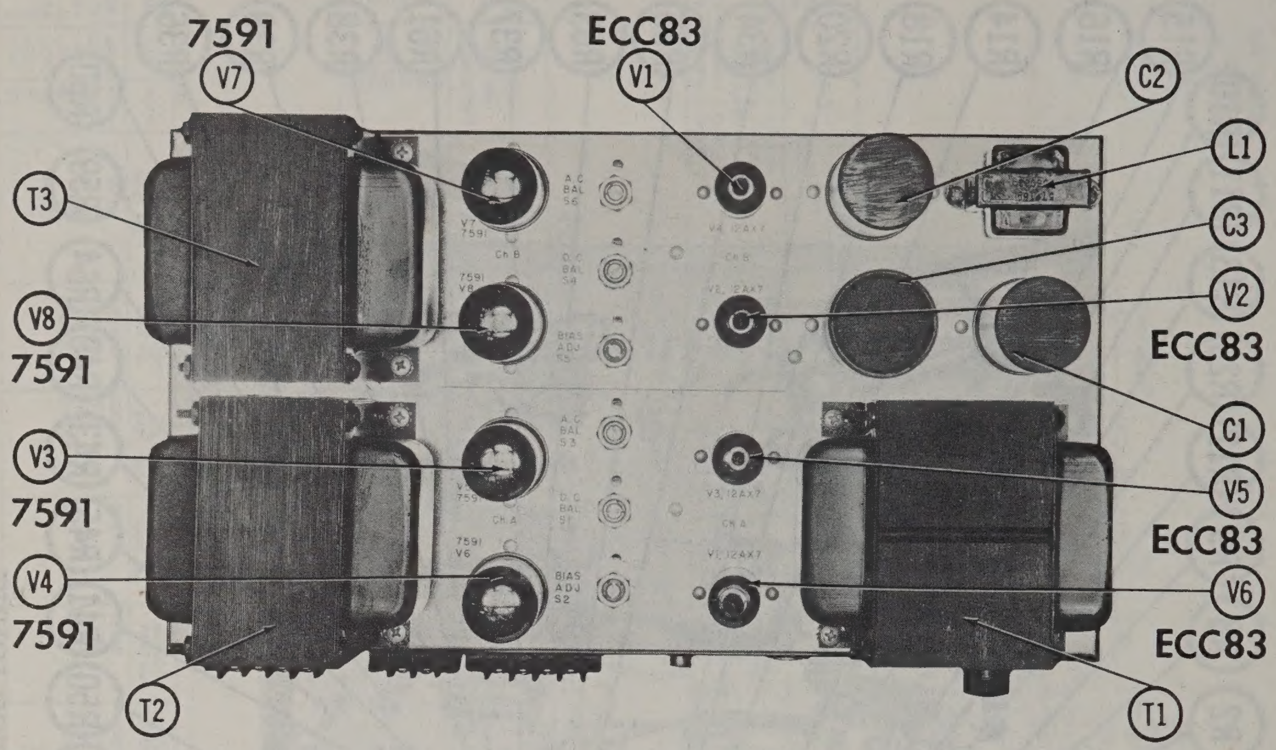
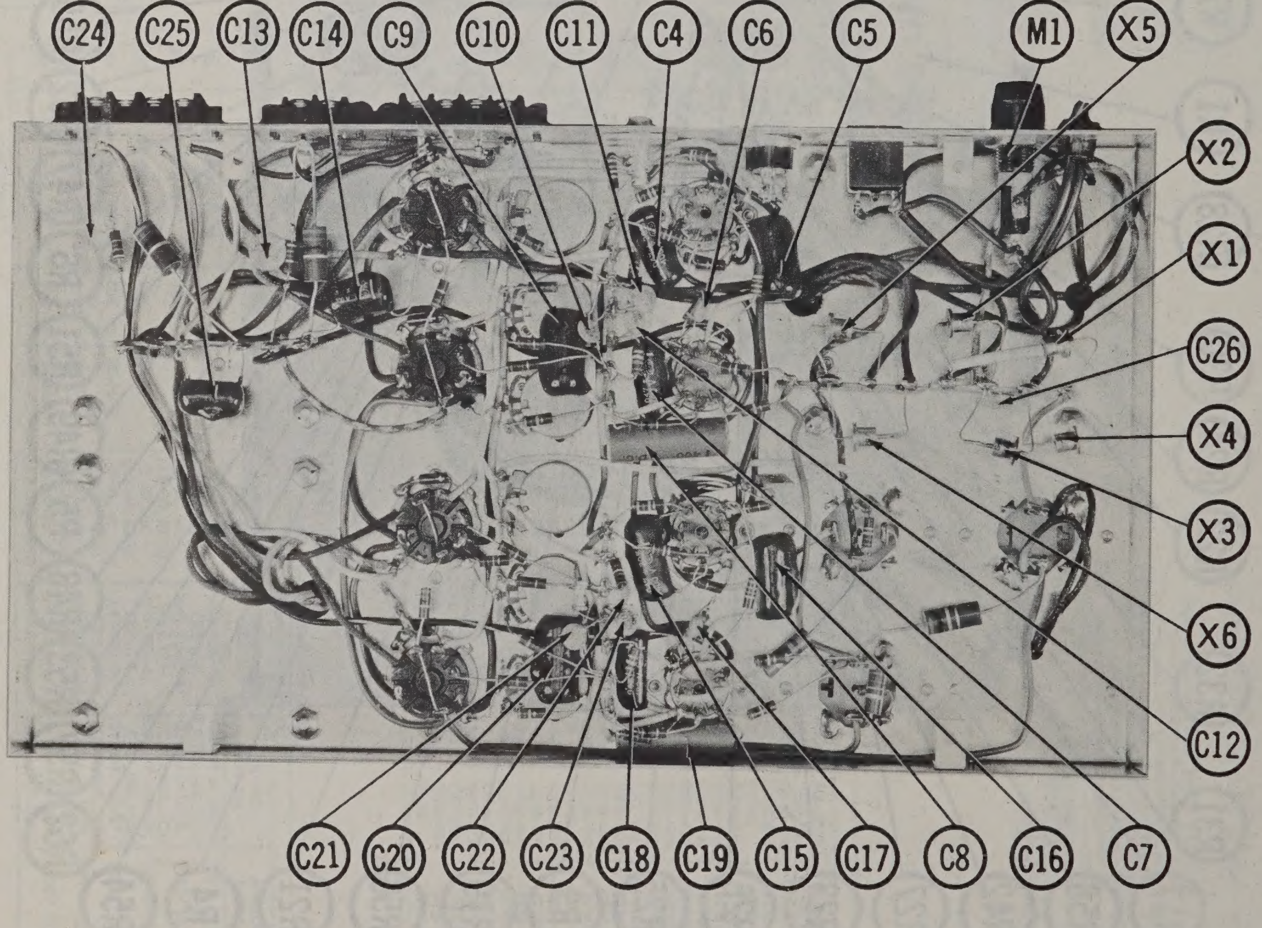


CHASSIS — TOP VIEW



CHASSIS BOTTOM VIEW — CAPACITOR & MISC. IDENT.

K2TQN

OLD RADIO

The 1928 Pilot Wasp Short-Wave Kit

Announcing their new $21.75 short-wave kit in 1928, Pilot's magazine advertisement said "Hear Stations the World Over" and the orders poured in. Several well known radio experts wrote articles about the Wasp in popular radio magazines. Most of the information was taken directly from the words of the Wasp's principal designer, Robert S. Kruse, then Technical Editor of *QST*. Having worked at *QST* for more than six years, Kruse was in the center of all the latest designs, activities and new developments in ham radio.

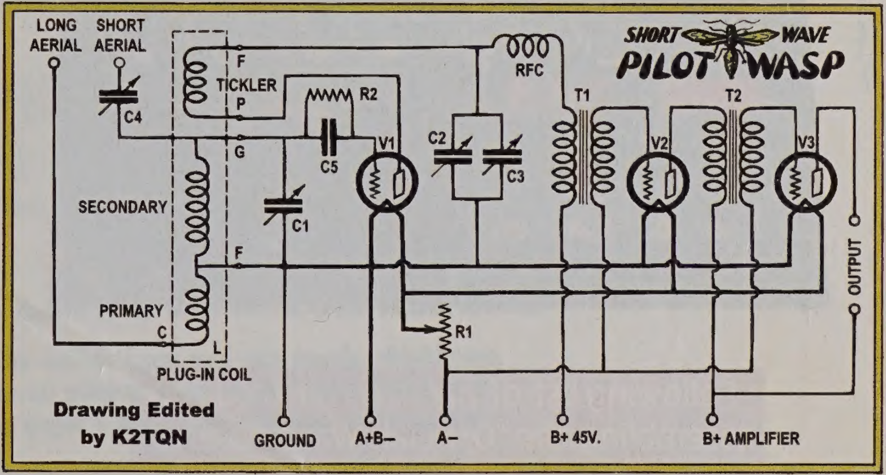
The Pilot Company had developed a set of five coils for short-wave listening. They knew that having a radio kit would help them sell more parts and more coil sets. (It is said that this coil set was so popular that the Bird Expedition to Little America purchased many sets of the coils and designed their radios around them.) Pilot had been making radio parts for years, and it was only natural for them to start selling kit radios. And having someone famous to design the radio would ensure many sales. Kruse was selected along with another well known designer, Milton Sleeper.

Based in Brooklyn, Pilot had a large resource of local radio experts and ham operators to draw from. They would have them purchase the kits, build the radios and report back, providing Pilot with statistics of all the long distance stations that could be heard with their radios. This information would be added to the advertising and put in their new magazine, *Radio Design*. This was a Pilot-owned magazine, reporting the latest designs and developments at their company. Kruse would leave his position at *QST* and go to work for Pilot.

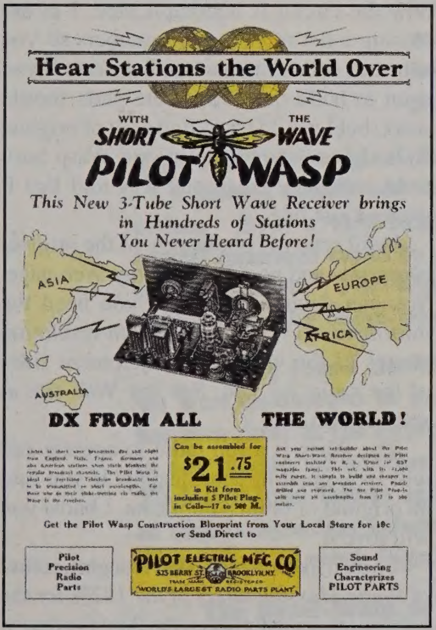
Discovering the Pilot Wasp

My first old radio was a 1929 Pilot Super-Wasp that I received when I was a teenager. For many years, I didn't know of the existence of its predecessor, the Wasp. I first saw one when I was attending the annual Boston Area Collector Radio Show run by John Terrey, W5DTQ, and his crew at *Antique Radio Classified* magazine back in February 1994 (**www.antiqueradio.com**). One of my collector friends there showed me a Pilot Wasp in great condition that he had just purchased. I really liked it and decided then that I would have to find one to go with my Super-Wasp.

Finding one wasn't all that easy. Over the years I missed a few on eBay, missed one at a hamfest and was told about one I just missed, in a typical story, "thrown out with the trash the week earlier." Then in 2002 at the Mid Atlantic Antique Radio Club (**www.maarc.org**) swap meet in Maryland, I found one complete with coils. I snapped it up.



Drawing Edited by K2TQN


Hear Stations the World Over

WITH THE

SHORT WAVE PILOT WASP

This New 3-Tube Short Wave Receiver brings in Hundreds of Stations You Never Heard Before!

ASIA
EUROPE
AFRICA
AUSTRALIA
DX FROM ALL THE WORLD!

Can be assembled for

$21.75

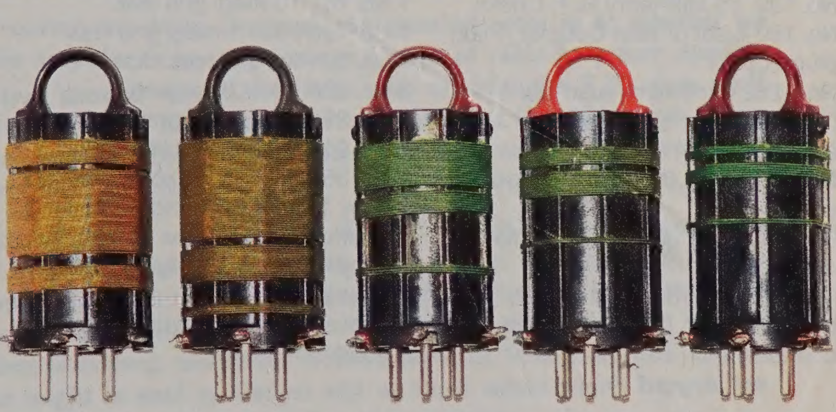
in Kit form including 5 Pilot Plug-in Coils—17 to 500 M.

Get the Pilot Wasp Construction Blueprint from Your Local Store for 10c or Send Direct to

Pilot Precision Radio Parts

PILOT ELECTRIC M'F'G CO
323 BERRY ST. BROOKLYN, N.Y.
TRADE MARK REGISTERED
"WORLD'S LARGEST RADIO PARTS PLANT"

Sound Engineering Characterizes PILOT PARTS


Wasp coil set No. 180-4, coils from left: No. 184 Blue ring, 200 to 500 meters; No. 183 Green ring, 93 to 203 meters; No. 182 Yellow ring, 45 to 105 meters; No. 181 Orange ring, 30 to 52 meters; No. 180 Red ring, 17 to 30 meters. Note: Bakelite rings at the top of the coils have lost their colors due to age. You can identify the coil only by observation.

John Dilks, K2TQN ◆ 125 Wharf Rd, Egg Harbor Township, NJ 08234-8501 ◆ k2tqn@arrl.org

PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REPLACEMENT DATA		
		IRC PART No.	WORKMAN PART No.	REMARKS
R7	470K			
R8	82K			
R9	4700Ω			
R10	33K			
R11	1meg			
R12	82K			
R13	1200Ω			
R14	100K			
R15	8200Ω 5%			(15K)*
R16	4700Ω			
R17	4700Ω			
R18	1meg			
R19	82K 5%			
R20	100K 5%			
R21	1500Ω			
R22	1.5meg			
R23	1.5meg			
R24	680K			
R25	1000Ω			
R26	270K 5%			
R27	20Ω 5%			Note 1
R28	1000Ω			
R29	270K 5%			
R30	20Ω 5%			Note 1
R31	15Ω 2W			
R32	82Ω			
R33	470K			
R34	82K			
R35	4700Ω			

ITEM No.	RATING	REPLACEMENT DATA		
		IRC PART No.	WORKMAN PART No.	REMARKS
R36	1meg			
R37	82K			
R38	1200Ω			
R39	33K			
R40	100K			
R41	4700Ω			
R42	4700Ω			
R43	8200Ω 5%			(15K)*
R44	1meg			
R45	100K 5%			
R46	1500Ω			
R47	82K 5%			
R48	1.5meg			
R49	1.5meg			
R50	680K			
R51	1000Ω			
R52	270K 5%			
R53	20Ω 5%			Note 2
R54	1000Ω			
R55	270K 5%			
R56	20Ω 5%			Note 2
R57	82Ω			
R58	15Ω 2W			
R59	220K			
R60	22K 1W			
R61	10K 2W			
R62	120K			
R63	22K			
R64	6.8Ω 1W			

Note 1. R27 and R30 are matched to 1%.
Note 2. R53 and R56 are matched to 1%.
* Alternate Value.

FILTER CHOKE

ITEM No.	RATINGS			REPLACEMENT DATA					NOTES
	CURRENT (Measured)	DC RES.	INDUCTANCE (0 CURRENT 1000 ∿)	PILOT PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
L1	.190A	25Ω	250MH	57-18					

TRANSFORMER (POWER)

ITEM No.	RATING			REPLACEMENT DATA					NOTES
	PRI.	SEC. 1	SEC. 2	PILOT PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	117V @ 1.3A	300V @ .400A AC	420VCT @ .300A DC	55-79					
	SEC. 3	SEC. 4	SEC. 5						
	6.3VCT @ 3.5A								

TRANSFORMER (AUDIO OUTPUT)

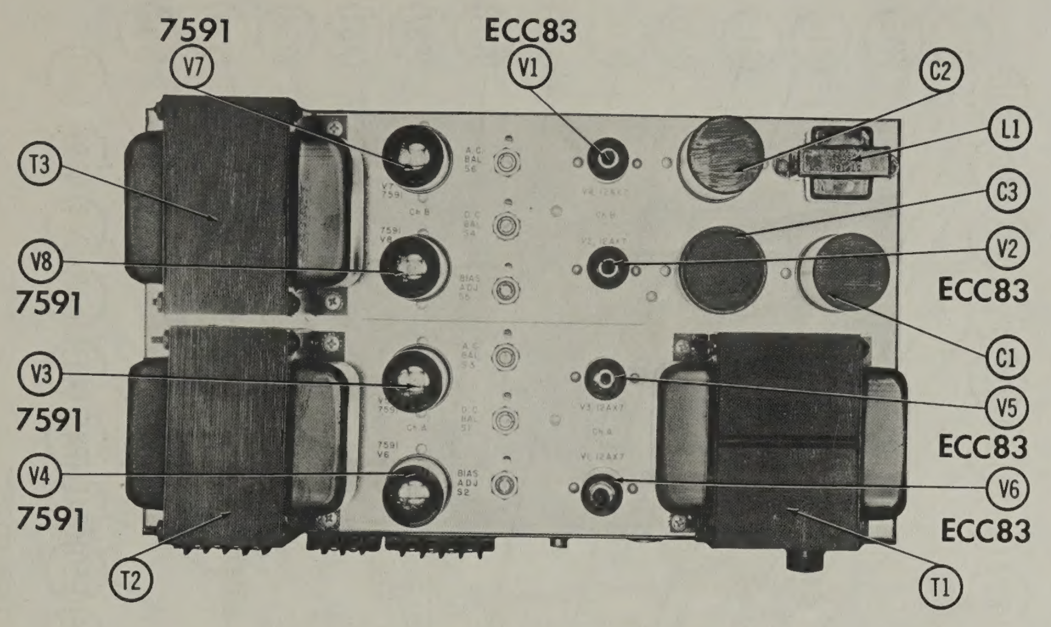
ITEM No.	IMPEDANCE		REPLACEMENT DATA					NOTES
	PRI.	SEC.	PILOT PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	5400Ω CT	16Ω Tap @ 8Ω, 4Ω	56-63					
T3	5400Ω CT	16Ω Tap @ 8Ω, 4Ω	56-63					

FUSES

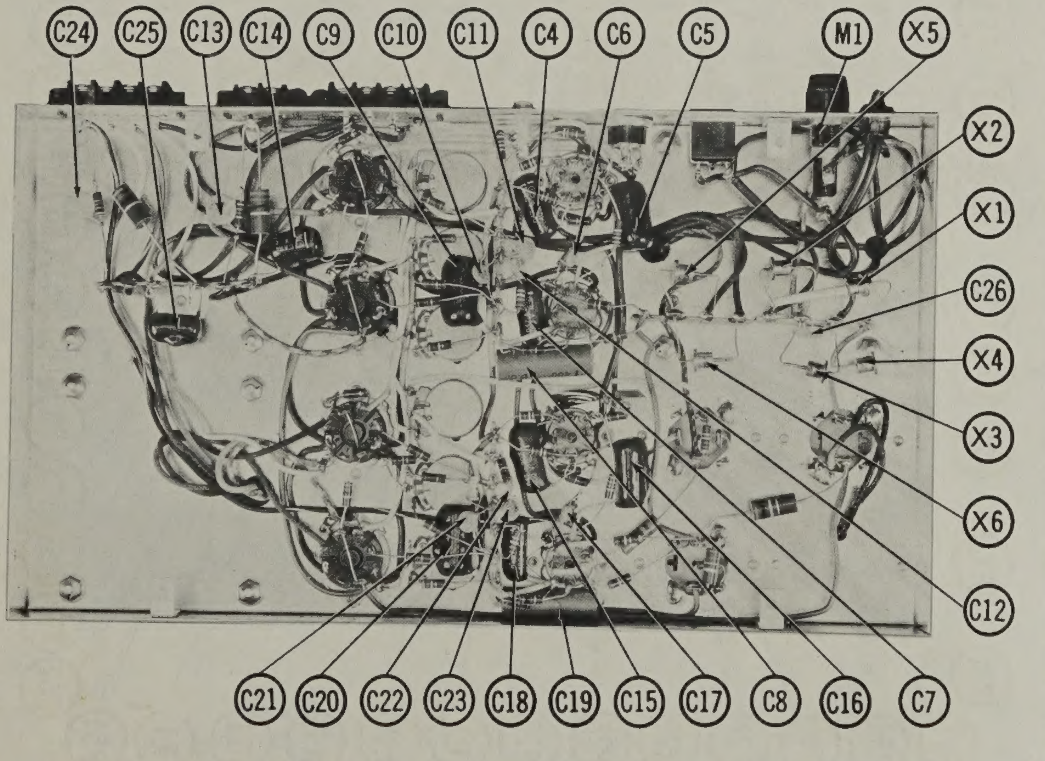
ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			PILOT PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M1	3AG	2½A 125V S/B	111-12		31302.5 (3AG 2½A 125V) S/B	342001	MDL 2½	HKP

WIRING DATA

General-use Unshielded Hook-up Wire .... Use BELDEN No. 8530 (Solid) Available in 12 Colors
8524 (Stranded) Available in 12 Colors
Power Cord .... Use BELDEN No. 17106 (Plastic) or 17126 (Rubber) - 6 Ft.
17109 (Plastic) or 17129 (Rubber) - 9 Ft.
Power Cord (Interlock Type) .... Use BELDEN No. 8874 (Rubber) or 8895 (Plastic)
Low-Loss Shielded Lead (Interconnecting) .... Use BELDEN No. 8401 or 8421
Phono Pick-up Arm Cable .... Use BELDEN No. 8430 (Two Conductor-Unshielded)
8429 (Two Conductor-Shielded)
8419 (Three Conductor-Shielded)



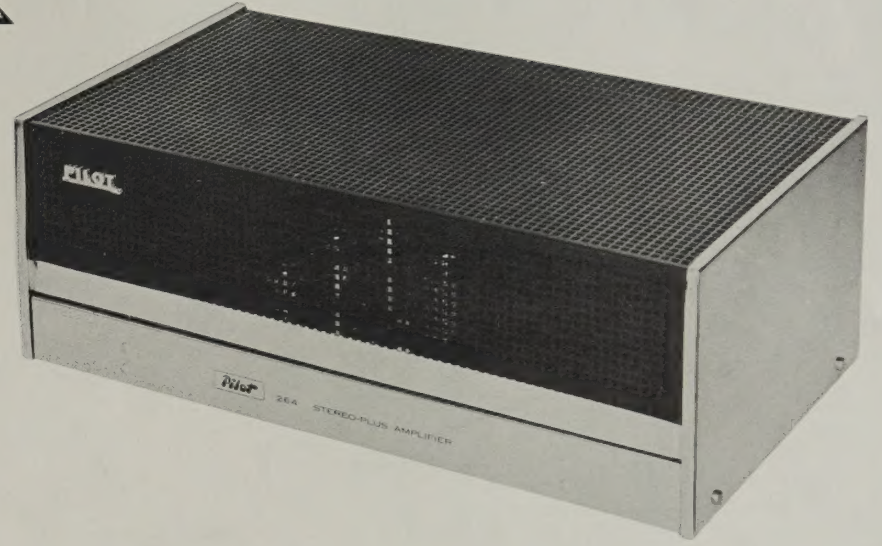
CHASSIS — TOP VIEW



CHASSIS BOTTOM VIEW — CAPACITOR & MISC. IDENT.

PHOTOFACT® Folder

PILOT
MODEL 264



TRADE NAME	Pilot Model 264
MANUFACTURER	Pilot Radio Corp., 37-06 36th Street, Long Island City 1, N. Y.
TYPE SET	AC Operated 8 Tube Stereo Amplifier
POWER SUPPLY	105 — 120 Volts AC, 60 Cycles RATING 125 Watts, 1.3 Amp. @117 Volts AC

ADJUSTMENTS

	SPECIAL INSTRUCTIONS	INDICATOR	ADJUST	REMARKS
	DC BALANCE ADJUSTMENTS			
1.	Remove 5 -pin shorting plug from test socket. Remove Lock nuts from Bias and DC Balance Controls.	DC voltmeter between pins 3 and 4 of test socket.	Channel B DC Balance (R5)	Adjust for zero volts on Voltmeter.
2.	"	DC Voltmeter between pins 1 and 2 of test socket.	Channel A DC Balance (R2)	"
	BIAS ADJUSTMENTS			
3.	"	Positive lead of Voltmeter to pin 3 of test socket, common to chassis.	Channel B Bias (R4)	Adjust for .82 volts DC on Voltmeter.
4.	"	Positive lead of Voltmeter to pin 1 of test socket, common to chassis.	Channel A Bias (R1)	"
	AC BALANCE ADJUSTMENTS	(USE EQUIPMENT WITH MINIMUM RESIDUAL DISTORTION)		
5.	Repeat Steps 1 thru 4. Connect the correct load to the output transformers. Connect signal generator to amplifier input.	Intermodulation Distortion Analyzer across terminals "4" and "0" of output transformer.	AC Balance Controls	Adjust for minimum distortion at full amplifier output with generator adjusted for 1000∿ and 1500∿. Repeat procedure for both channels.

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed. Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. ©1962 Howard W. Sams & Co., Inc., Indianapolis 6, Indiana. Printed in U.S. of America

LV204

K2TQN

OLD RADIO

The 1928 Pilot Wasp Short-Wave Kit

Announcing their new $21.75 short-wave kit in 1928, Pilot's magazine advertisement said "Hear Stations the World Over" and the orders poured in. Several well known radio experts wrote articles about the Wasp in popular radio magazines. Most of the information was taken directly from the words of the Wasp's principal designer, Robert S. Kruse, then Technical Editor of *QST*. Having worked at *QST* for more than six years, Kruse was in the center of all the latest designs, activities and new developments in ham radio.

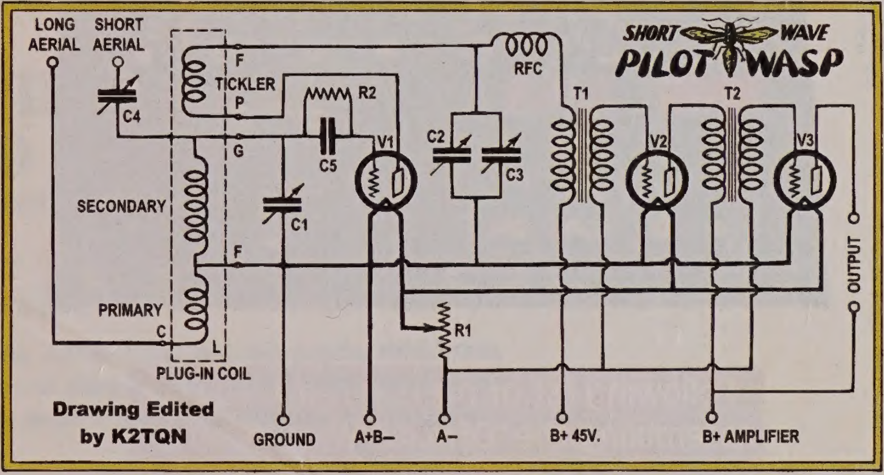
The Pilot Company had developed a set of five coils for short-wave listening. They knew that having a radio kit would help them sell more parts and more coil sets. (It is said that this coil set was so popular that the Bird Expedition to Little America purchased many sets of the coils and designed their radios around them.) Pilot had been making radio parts for years, and it was only natural for them to start selling kit radios. And having someone famous to design the radio would ensure many sales. Kruse was selected along with another well known designer, Milton Sleeper.

Based in Brooklyn, Pilot had a large resource of local radio experts and ham operators to draw from. They would have them purchase the kits, build the radios and report back, providing Pilot with statistics of all the long distance stations that could be heard with their radios. This information would be added to the advertising and put in their new magazine, *Radio Design*. This was a Pilot-owned magazine, reporting the latest designs and developments at their company. Kruse would leave his position at *QST* and go to work for Pilot.

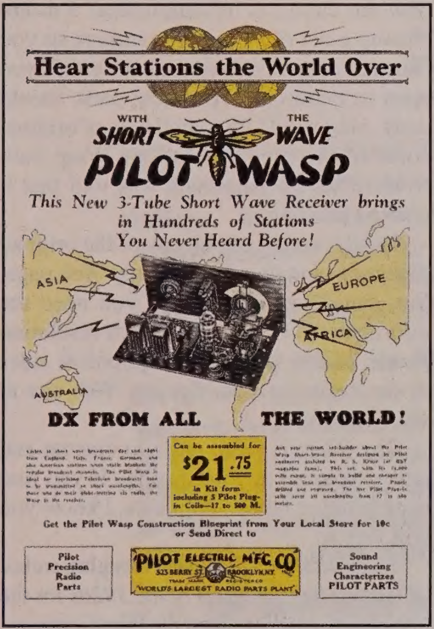
Discovering the Pilot Wasp

My first old radio was a 1929 Pilot Super-Wasp that I received when I was a teenager. For many years, I didn't know of the existence of its predecessor, the Wasp. I first saw one when I was attending the annual Boston Area Collector Radio Show run by John Terrey, W5DTQ, and his crew at *Antique Radio Classified* magazine back in February 1994 (**www.antiqueradio.com**). One of my collector friends there showed me a Pilot Wasp in great condition that he had just purchased. I really liked it and decided then that I would have to find one to go with my Super-Wasp.

Finding one wasn't all that easy. Over the years I missed a few on eBay, missed one at a hamfest and was told about one I just missed, in a typical story, "thrown out with the trash the week earlier." Then in 2002 at the Mid Atlantic Antique Radio Club (**www.maarc.org**) swap meet in Maryland, I found one complete with coils. I snapped it up.



Drawing Edited by K2TQN



Hear Stations the World Over

WITH THE
SHORT WAVE
PILOT WASP

This New 3-Tube Short Wave Receiver brings in Hundreds of Stations You Never Heard Before!

ASIA
EUROPE
AFRICA
AUSTRALIA

DX FROM ALL THE WORLD!

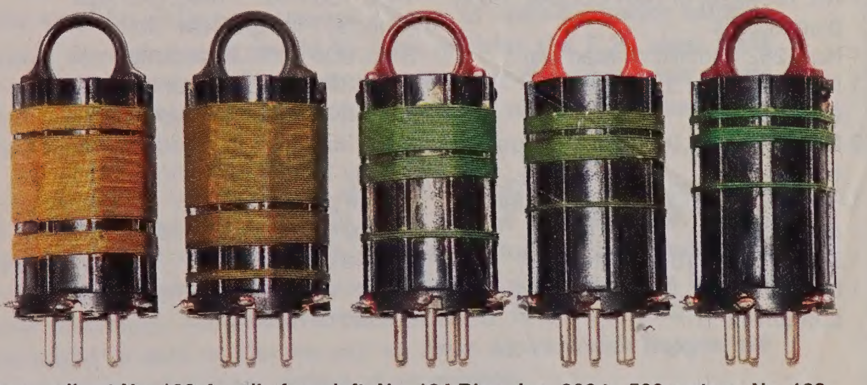
Can be assembled for
$21.75
in Kit form including 5 Pilot Plug-in Coils—17 to 500 M.

Get the Pilot Wasp Construction Blueprint from Your Local Store for 10c or Send Direct to

Pilot Precision Radio Parts

PILOT ELECTRIC MFG. CO
323 BERRY ST. BROOKLYN, N.Y.
TRADE MARK REGISTERED
"WORLD'S LARGEST RADIO PARTS PLANT"

Sound Engineering Characterizes PILOT PARTS



Wasp coil set No. 180-4, coils from left: No. 184 Blue ring, 200 to 500 meters; No. 183 Green ring, 93 to 203 meters; No. 182 Yellow ring, 45 to 105 meters; No. 181 Orange ring, 30 to 52 meters; No. 180 Red ring, 17 to 30 meters. Note: Bakelite rings at the top of the coils have lost their colors due to age. You can identify the coil only by observation.

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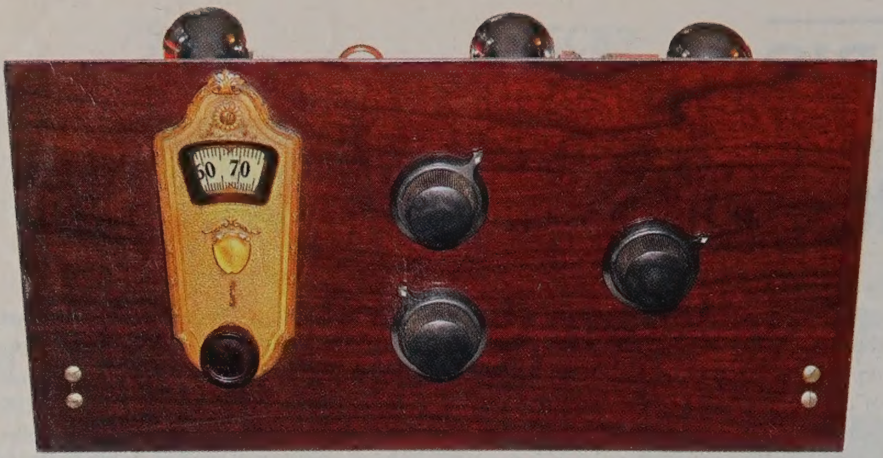
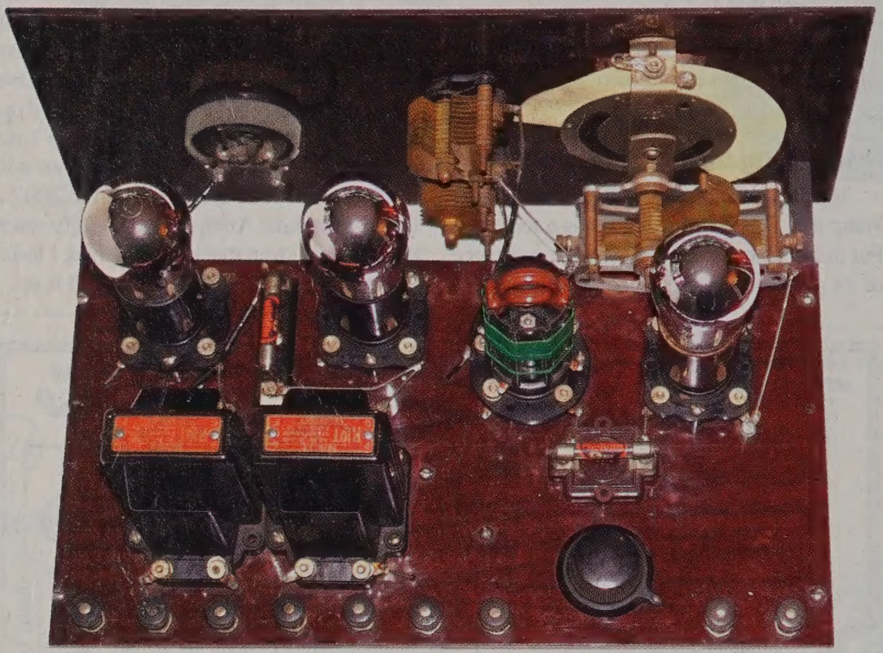




Following list of parts is required for assembling the "Official" Wasp receiver

1 No. 130 85 Millihenry R. F. Choke
1 No. 180-4 set of Twin-Coupler (Pilot) plug-in coils
1 No. 1282 Pilot illuminated dial
1 No. 1608 Pilot .00014 mfd. condenser
2 No. J-23 Pilot .0001 mfd. midget condenser
1 No. J-5 Pilot .000015 mfd. midget condenser
1 No. 910 Pilot 10-ohm rheostat
1 No. 50-0 Pilot .0002 mfd. fixed condenser
1 No. 761 10-meg. grid leak
1 No. 750 Pilot .1 meg. grid leak
4 No. 50 Pilot grid leak clips
3 No. 206 Pilot UX sockets
2 No. 391 Pilot A. F. transformers
1 No. 212 Pilot UY socket
2 No. 35 Pilot 1-in. Bakelite brackets
1 7 by 14-in. Westinghouse Micarta front panel
1 7 by 13-in. Westinghouse Micarta base panel
9 Pilot engraved binding posts
3 good 01A tubes

Looking it over, I noticed Kruse had designed a simple radio with only a handful of parts; this was to keep the price down and make it affordable. The actual circuit is pretty much common for radios of that time period. Kruse said what made this radio different was the design of the coils and the exact layout of the parts.

Pilot provided a set of blueprints with the kit that showed in detail where to drill the holes to mount the parts, where to run the wiring, and just about everything a novice builder would need to know to put it together. They did not provide step-by-step instructions, like Heathkit did years later. Basically, it was a blueprint and a box of parts.

As soon as they started selling the radios, they came out with additional articles that provided some guidance on building and operating them. In fact, several writers wrote very similar articles in several magazines. Among them were John Geloso and Robert Hertzberg. These men, along with Alfred Ghirardi, Zeh Bouck, Robert Kruse and Milton Sleeper, would become the brain trust of the Pilot design department and would devise many of Pilot's circuits and radios over the next couple of years.

Some Pilot Company History

The Wasp would be modified several times in the Pilot laboratory and eventually grow into its own replacement in 1929, the Pilot Super-Wasp. These were good times for the company.

The good times would not last. They expanded and moved the operation to a large building complex in Lawrence, Massachusetts. The move interrupted product output, however, and after a bitter cold winter in 1932, key personnel left and relocated to other companies. Owner Isidor Goldberg relocated back to New York and started a new company, also called Pilot. He built radios for the home, and later participated in war industry contract work.

Conclusion

You can see in the photos just how the radio was designed, and in the schematic how the circuit is uncomplicated. I'm enclosing a list of Pilot part numbers so you can start collecting parts at hamfests if you want to build one. Substitute parts should work, but I would try to find a set of original coils. I have seen at least one Wasp built from substitute parts, and was told that it worked just fine.

I will scan my photocopy of the original blueprints and post them on my Web page. You can download them if you need the information. I will also have high-resolution photos of the wiring and equipment sides of the radio for you. See my Web site at **www.k2tqn.com**.

The Wasp is a fun radio to operate and will look great in your display. If you find an original or build a duplicate, I know you will love it.

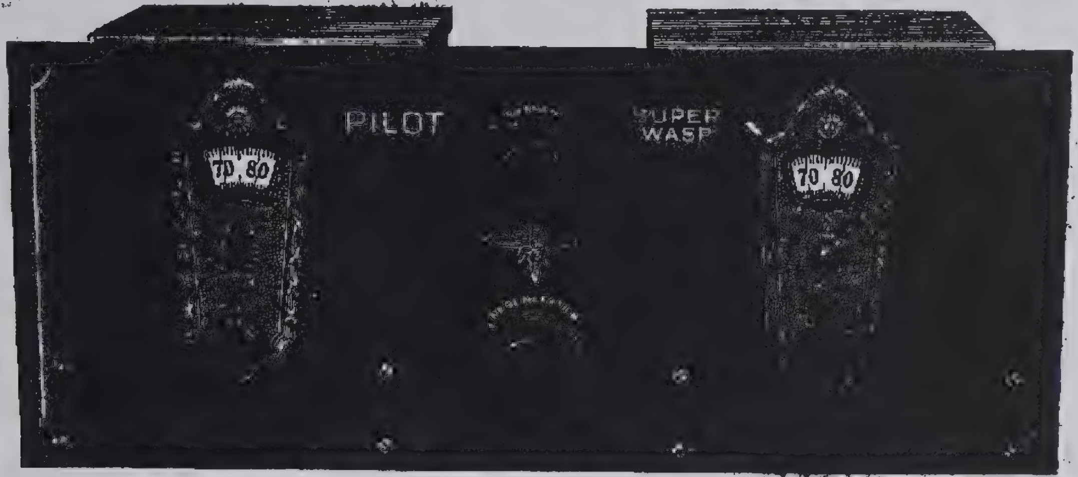
I would like to thank Alan Douglas, author of *Radio Manufacturers of the 1920s* for the historic information about the Pilot Company, and also my good friend Jim Troe, W2GRX, for selling me this wonderful radio.

DATA SHEET No. 7
SUPER-WASP
BATTERY TYPE
Double-Duty Receiver
14-500 Meters

TRADE MARK

WORLD'S
LARGEST RADIO
PARTS
MANUFACTURER

PILOT RADIO & TUBE CORPORATION, 323 BERRY ST., BROOKLYN, N. Y., U. S. A.



THE PILOT SUPER-WASP K-110 BATTERY TYPE

Double-Duty Receiver for Both Long and Short Waves.

By ROBERT S. KRUSE

Complete Super-Wasp Kit—No. K-110—Code ZWAGS

Includes drilled front and sub-panels, shield cans, ten special plug-in coils, all the parts listed in detail on pages 4 and 5 and full-size working blueprint.

WHEN the original Wasp receiver was being designed, the question arose as to whether we should merely add an audio amplifier or at once attempt a stage of radio-frequency amplification. Even a very brief analysis showed that it would be wise to defer the R.F. stage until several questions could be answered in better form than that represented by the short-wave tuners on the market. The Wasp therefore appeared with an audio amplifier, and it was exceedingly well received by short-wave broadcast listeners.

Having found the Wasp to be entirely satisfactory in the field as well as in the laboratory, we were encouraged to proceed with the original purpose of using a stage of tuned R.F. This has been done in the Super-Wasp, to the final form of which the entire Pilot staff has contributed in one manner or another. A considerable portion of the work was done simultaneously in New York, by John Geloso and Robert Hertzberg, and at the writer's home in West Hartford, Conn., so that independent information might be used to disclose any of those errors which happen too often when all work together at one place and become victims of an opinion.

The Super-Wasp as it now stands is unquestionably the best all-round short-wave receiver ever offered the listener. Its points of superiority are as follows: (1) Increased sensitivity and

REF DES	DESCRIPTION	PART NO.
R2219	Resistor, Carbon Film, 5.1 Ω ± 5%, 1/4 W	3220003
R2220	Resistor, Carbon Film, 820 Ω ± 5%, 1/4 W	3220145
R2221	Resistor, Carbon Film, 820 Ω ± 5%, 1/4 W	3220145
R2222	Resistor, Carbon Film, 820 Ω ± 5%, 1/4 W	3220145
R2223	Resistor, Carbon Film, 330 Ω ± 5%, 1/4 W	3220090
R2224	Resistor, Carbon Film, 560 Ω ± 5%, 1/4 W	3220125
R2225	Resistor, Carbon Film, 330 Ω ± 5%, 1/4 W	3220145
R2226	Resistor, Carbon Film, 5.1 Ω ± 5%, 1/4 W	3220003
R2227	Resistor, Variable, 500 Ω	3260650
RFC2201	Choke Assy.	2512506
RFC2202	Choke Assy.	2512506
T2201	Inductor, Toroid	2510009
U2201	I.C., 78L05ACP	3040030

NOTES:

selectivity made possible by the TUNED screen-grid R.F. stage. (2) Universal wavelength range. Tunes from 14 to 500 meters. An excellent broadcast receiver as well as the finest of all short-wave sets. (3) Absolutely no "hand capacity" effects. (4) Completely shielded. (5) Easily assembled and wired from kit of parts. (6) Inexpensive. And last, but most important, (7) Ability to bring in short-wave broadcasting stations better than all previous short-wave receivers.

Build a Super-Wasp and experience the greatest of all radio thrills—hearing foreign broadcasting stations. The editor of RADIO DESIGN, while testing a Super-Wasp for a few minutes after dinner and then again before going to bed (location: New York), heard stations in Chelmsford, England; Manitoba, Canada; and Costa Rica, Central America! These were broadcasting voice and music, NOT CODE.

Beginning with the matter of shielding, one had at once the question of the material to be used and the thickness required. Aluminum has some evident advantages in that it does not tarnish readily, may be formed easily and is light. It was therefore used and a light gauge made possible by placing the R.F. shield and the detector shield at opposite ends of the set. The base-plate or "sub-panel" of the set was made of much heavier sheet aluminum so as to provide a zero-potential plane which would not be upset by currents flowing in it. For the same reason also the panel was made of heavier material.

There is not space here to discuss the reasons which led to the particular location of the wiring, the use of a ground at each socket, the series feed of the 222 plate supply through the tuned detector-feed circuit, or the rather unusual circuit arrangement inside the cans. We can say only that the R.F. amplification obtained has been so adjusted that it produces a very handsome improvement in performance (as compared with the Wasp) while at the same time assuring a gratifying freedom from "crankiness". Since the set is to be used with all sorts of antennas this obviously means that the R.F. gain cannot be pushed to extremes.

For this no apology is offered. On the contrary, I wish to assert that any materially greater gain would be worse than useless since the "useful selectivity" of the set would be ruined thereby, besides creating operating difficulties in the way of uncontrolled oscillation when the set is worked under improper conditions. The practical set for sale in kit form is the one which works when correctly assembled—not the one which works *if* everything is exactly and critically adjusted.

GOOD BROADCAST RECEPTION ON SUPER-WASP

In the broadcast region the Super-Wasp can be thought of as comparing very nicely indeed with other four and five-tube sets. Obviously one must not expect the same selectivity from two tuned circuits as from three or four, nor will a single 222 develop the same gain as a number of the same. It is therefore not pretended that seven-tube performance has been obtained. None the less, both the sensitivity and the selectivity are such as to permit good use of the set to be made in the normal broadcast band whenever the short waves are behaving badly. Similarly, when the normal receiver is struck by a "dead evening", the Super-Wasp need but be shifted to the short waves.

The first model Super-Wasp had been provided with R.F. coils carrying primaries, also providing for condenser feed from the antenna to the top (grid) end of the tuned circuit. This was the same arrangement that had been used in the original Wasp receiver. It was found that the condenser feed was not well suited for use in the broadcast region of 200-500 meters for the reason that satisfactory coupling could not be obtained unless the feed condenser was enlarged materially. When this was done the condenser was of a capacity which tuned the antenna as a series system and produced a condition of two-frequency response—a wholly inoperative condition.

AUTOMATIC AERIAL CHANGE-OVER

The user would find this out for himself, just as he had in the simpler Wasp receiver, but the shifting of the antenna is less convenient in the case of a shielded set of larger dimensions. It was therefore decided to use a device suggested by Mr. Geloso. This was a set of coils so connected that the 200-500 meter coil carried an antenna, or primary coil, while the others had none and were so connected that the feed-condenser was automatically connected in when they were put into the socket. Thus without any need for two antenna posts it was possible to use the primary coil in the 200-500 meter region while retaining the convenient feature of variable coupling through a small condenser at shorter waves.

Having arrived at this point, it was believed that the short-wave performance could be taken for granted, with the possible exception of the regeneration control. The broadcast-range response was again checked and the primary, or antenna coil adjusted so that the average receiving

TR-7 POWER AMPLIFIER BOARD

REF DES	DESCRIPTION	PART NO.
C2301	Capacitor, Mica, 100 pF ± 5%, DM-15	3161680
C2302	Capacitor, Mica, 500 pF ± 10%, DM-15	3170420
C2303	Capacitor, Mica, 100 pF ± 5%, DM-15	3161680
C2304	Capacitor, Mica, 500 pF ± 10%, DM-15	3170420
C2305	Capacitor, Mica, 100 pF ± 5%, DM-15	3161680
C2306	Capacitor, Mica, 810 pF ± 1%, DM-19	3170520
C2307	Capacitor, Disc, .05 μF + 80%, Z5U	3161630
C2308	Capacitor, Disc. .05 μF + 80%, Z5U	3161630
C2309	Capacitor, Mica, 500 pF ± 10%, DM-15	3170420
C2310	Capacitor, Mica, 500 pF ± 10%, DM-15	3170420
C2311	Capacitor, Electrolytic, 10 μF ± 20%	3180062
C2312	Capacitor, Electrolytic, 10 μF ± 20%	3180062
C2313	Capacitor, Disc, .05 μF + 80%, Z5U	3161630
C2314	Capacitor, Electrolytic, 1 μF ± 20%, 50 V	3180008
C2315	Capacitor, Tantalum, .22 μF ± 10%, 35 V	3183100
C2316	Capacitor, Electrolytic, 10 μF ± 20%, 25 V	3180065
C2318	Capacitor, Disc, .05 μF + 80%, Z5U	3161630
C2319	Capacitor, Electrolytic, 220 μF, 16 V	3180212
C2320	Capacitor, Mica, 300 pF ± 5%, DM-20	3170310
C2321	Capacitor, Mica, 300 pF ± 5%, DM-20	3170310
C2322	Capacitor, Disc, .05 μF + 80%, Z5U	3161630
C2323	Capacitor, Disc, .1 μF ± 20%, 16 V	3161680
C2325	Capacitor, Disc, .05 μF + 80%, Z5U	3161630
C2326	Capacitor, Electrolytic, 100 μF, 16 V	3180148
C2327	Capacitor, Mica, 500 pF ± 10%, DM-15	3170420
C2328	Capacitor, Mica, 1000 pF ± 2%, DM-20	3170570
L2301	Inductor, Toroid	2510001
L2302	2 Ferrite Beads	3523205
L2303	NOT USED	
L2304	3 Ferrite Beads	3523205
L2305	3 Ferrite Beads	3523205
L2306	NOT USED	
L2307	Inductor, Toroid	2510001
L2308	Inductor, Toroid	2510001
Q2301	Transistor, SRF2338	3030299
Q2302	Transistor, SRF2338	3030299
Q2303	Transistor, SRF2337	3030298
Q2304	Transistor, SRF2337	3030298
Q2305	Transistor, EP487	3030260
Q2306	Transistor, EP487	3030260
R2301	Resistor, Carbon Film, 22 Ω ± 5%, 1/4 W	3220015
R2302	Resistor, Wire Wound, .15 Ω ± 10%, 2 W	3250010
R2303	Resistor, Composition, 47 Ω ± 10%, 1/2 W	3230090
R2304	Resistor, Wire Wound, .82 Ω ± 10%, 2 W	3250030
R2305	Resistor, Composition, 82 Ω ± 10%, 1/2 W	3230110
R2306	Resistor, Wire Wound, 3.9 Ω ± 5%, 5 W	3250090
R2307	Resistor, Carbon Film, 33 Ω ± 5%., 1/4 W	3220025
R2308	Resistor, Composition, 100 Ω ± 10%, 1/2 W	3230115
R2309	Resistor, Composition, 10 Ω ± 10%, 1/2 W	3230065
R2310	Resistor, Composition, 100 Ω ± 10%, 1/2 W	3230115
R2311	Resistor, Composition, 10 Ω ± 10%, 1/2 W	3230065

antenna will have somewhat more coupling than is strictly necessary. The proper value may then be obtained by putting into the antenna lead a "postage stamp" mica condenser whose value is to be found by trial. There is nothing critical about this and the proper value will be found by trying .0005, .00025 and .0001 mf., all of which are usually at hand. With smaller antennas the condenser is not needed.

It was not desired to strike any particular value of sharpness of tuning but rather to make sure that over the 200-500 range the sharpness compared decently with sets that have been found acceptable for regions in which battery-operated sets are used for broadcast reception. It was realized fully that one cannot, with two tuned circuits, obtain extreme selectivity except by the use of a small antenna. This does no harm, since the city-dweller can use such a 10-30 foot antenna with perfect satisfaction. It is effective on short waves and his 200-500 meter signals are strong because of their nearby origin, hence can also be received on such an antenna.

The comparison was therefore made as to both sensitivity and selectivity on the Super-Wasp, on a very popular set with a stage of 199-tube tuned R.F., on a set with an "untuned" 222, and on a set with a tuned 222 having its condenser ganged with that of the detector. All of the sets used a regenerative detector and two audio stages.

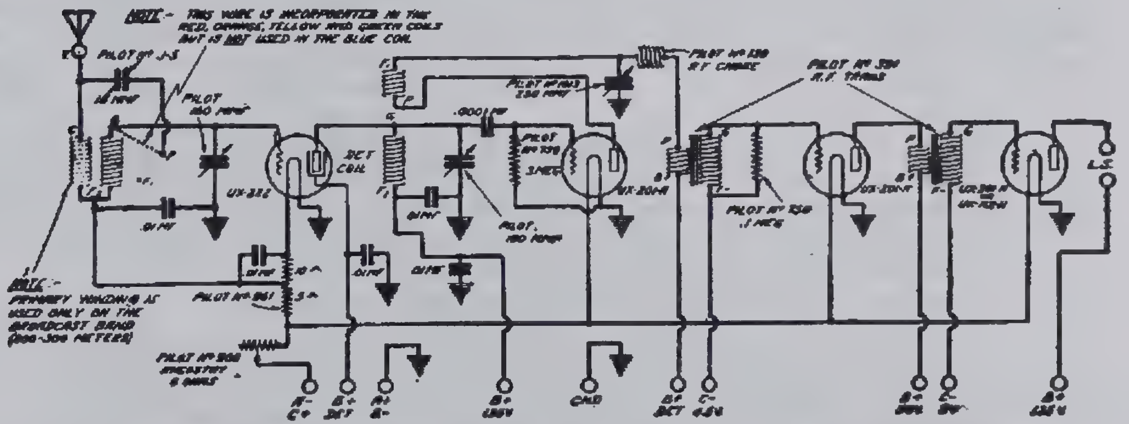
Next after the Super-Wasp the set with the 199 stage showed the best gain, likewise the best flatness of response over the 200-500 meter region. The Super-Wasp had a considerable advantage, however. The gang-tuned job was very uneven because the condensers did not run together, especially on the smaller coils. For this exact reason the Super-Wasp was made two-control.

REGENERATION CONTROL EFFECTIVE

One thing that one does not want in a receiver is to have the regeneration control affect the tuning. Since condenser control of regeneration is being used, the suspicion naturally arises that a disagreeable amount of this effect will be found. In the broadcast (200-500 meter or blue coil) region this will be found to be entirely wrong, the tuning effect being exceedingly small. As the smaller coils are used the effect begins to be perceptible, though never very serious. When the smallest, or red coil is used it will be found that the antenna tuning is somewhat less sharp than before and one may therefore set it at about the right value, after which the regeneration control and the detector-tuning may be handled easily together.

When proceeding in this manner one does not become particularly conscious of the remaining tuning effect, while one does at the same time remain thankful for a control method that works on the smallest coil as well as the largest—which is not the least important manner in which the Super-Wasp differs from current practice.

Now that something has been told about the background of the Super-Wasp, we can proceed to a description of the final receiver as it is assembled from a complete kit of standardized parts made up by the Pilot company. The accompanying illustrations show a finished set made exactly in accordance with the following instructions. When you buy a kit you will receive with it a full-size blueprint which will greatly facilitate your work.

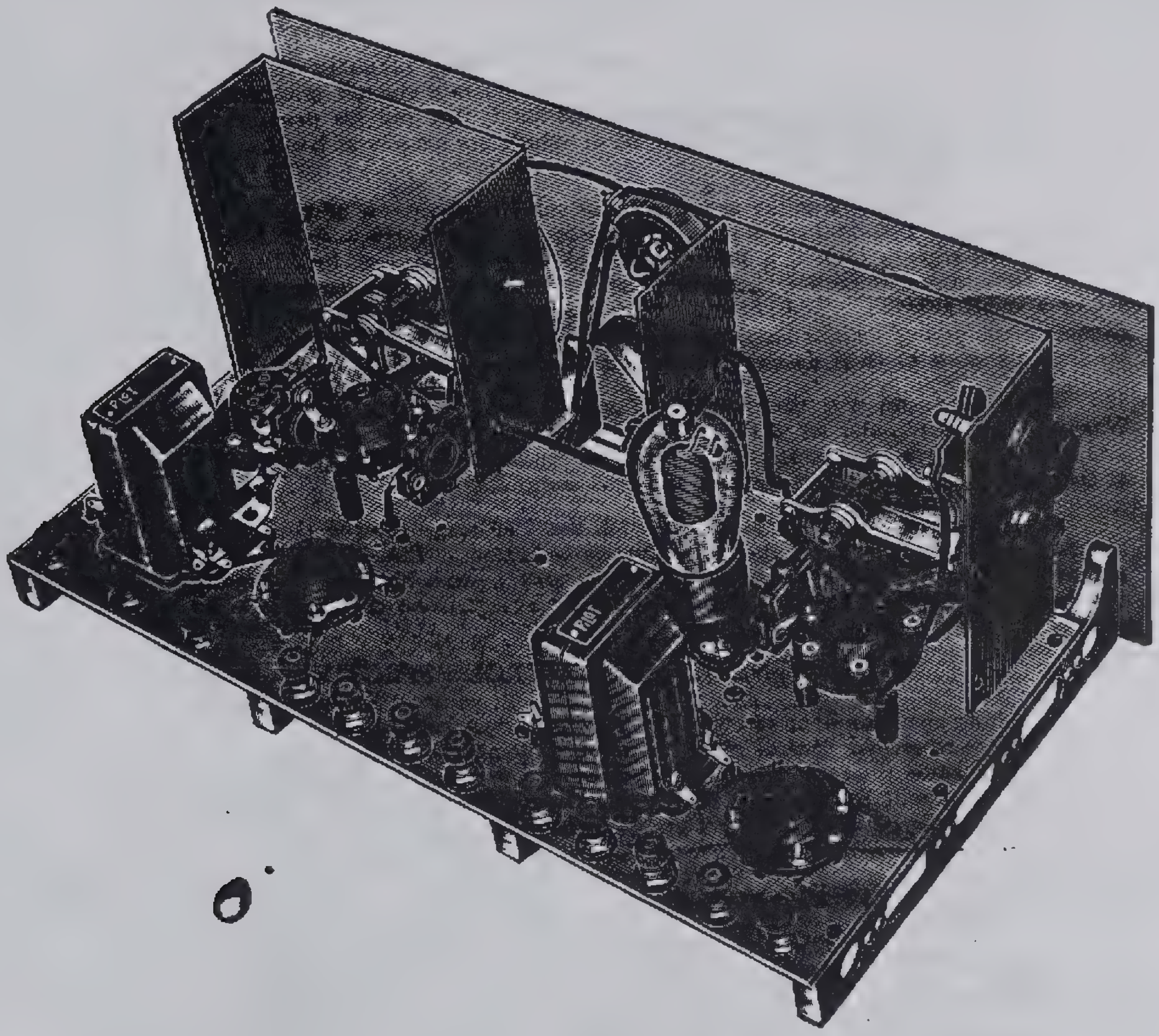

NOTE:- THIS WIRE IS INCORPORATED IN THE RED, ORANGE, YELLOW AND GREEN COILS BUT IS NOT USED IN THE BLUE COIL.
UX-222
DET COIL
.0001 MF
UX-201A
R.F. CHOKE
R.F. TRANS
L.S.
GND
NOTE:- PRIMARY WINDING IS USED ONLY ON THE BROADCAST BAND

The complete schematic diagram of the Super-Wasp. The various ground symbols indicate connections to the metal chassis of the receiver.

REF DES	DESCRIPTION	PART NO.
R2312	Resistor, Composition, 15 Ω ± 10%, 2 W	3240300
R2313	Resistor, Carbon Film, 100 Ω ± 5%, 1/4 W	3220055
R2314	Resistor, Carbon Film, 100 Ω ± 5%, 1/4 W	3220055
R2315	Resistor, Composition, 2 Ω ± 5%, 1/2 W	3230010
R2316	Resistor, Composition, 2 Ω ± 5%, 1/2 W	3230010
R2317	Resistor, Composition, 15 Ω ± 10%, 1 W	3240010
R2318	Resistor, Composition, 150 Ω ± 10%, 2 W	3240320
R2319	Resistor, Composition, 150 Ω ± 10%, 2 W	3240320
RFC2301	Choke Assy., Wide Band	2512525
RFC2302	Choke Assy., Wide Band	2512525
RFC2303	Choke Assy.	3524080
T2301	Transformer, PA Input	2512109
T2302	Transformer, Toroid	2510013
T2303	Transformer, PA Driver	2512108
T2304	Transformer, PA Output	2512107
U2301	I.C., MC7805CP	3040160

NOTES:

ASSEMBLE AND WIRE IT IN ONE EVENING



An assembled Super-Wasp with the back halves of the shield cans removed to reveal the parts inside the cans. Notice how the sockets for the plug-in coils are elevated above the sub-panel by means of hard-rubber bushings.

It should not take you more than an hour and a half to assemble a Super-Wasp. Once you have mounted everything, you should be able to wire the whole outfit in another hour, or even less. The arrangement of the parts has been worked out so carefully that most of the connections are only an inch or two long; all the longer leads are part of the filament circuit, which is not critical as to length of wiring.

Before tightening up a single screw, take out all the parts from the box, unwrap them, and place them before you on the table. Study the illustrations and drawings very carefully, and identify each piece of apparatus. Don't rush right into the assembly work the minute you receive your kit; the few minutes you spend in studying the various parts will make up for themselves many times over when you start mounting sockets, condensers and transformers.

THE NECESSARY PARTS FOR THE SET

The following Pilot parts are used in the construction of the Super-Wasp:

1—No. 705 front panel, 7½ x 18 by $\frac{1}{16}$ inches, drilled and engraved.

1—No. 706 sub-panel, 8 x 17 by $\frac{1}{16}$ inches, drilled with all mounting and wiring holes.

4—No. 37 metal sub-panel brackets.

2—No. 1611 .00016-mf. variable condensers.

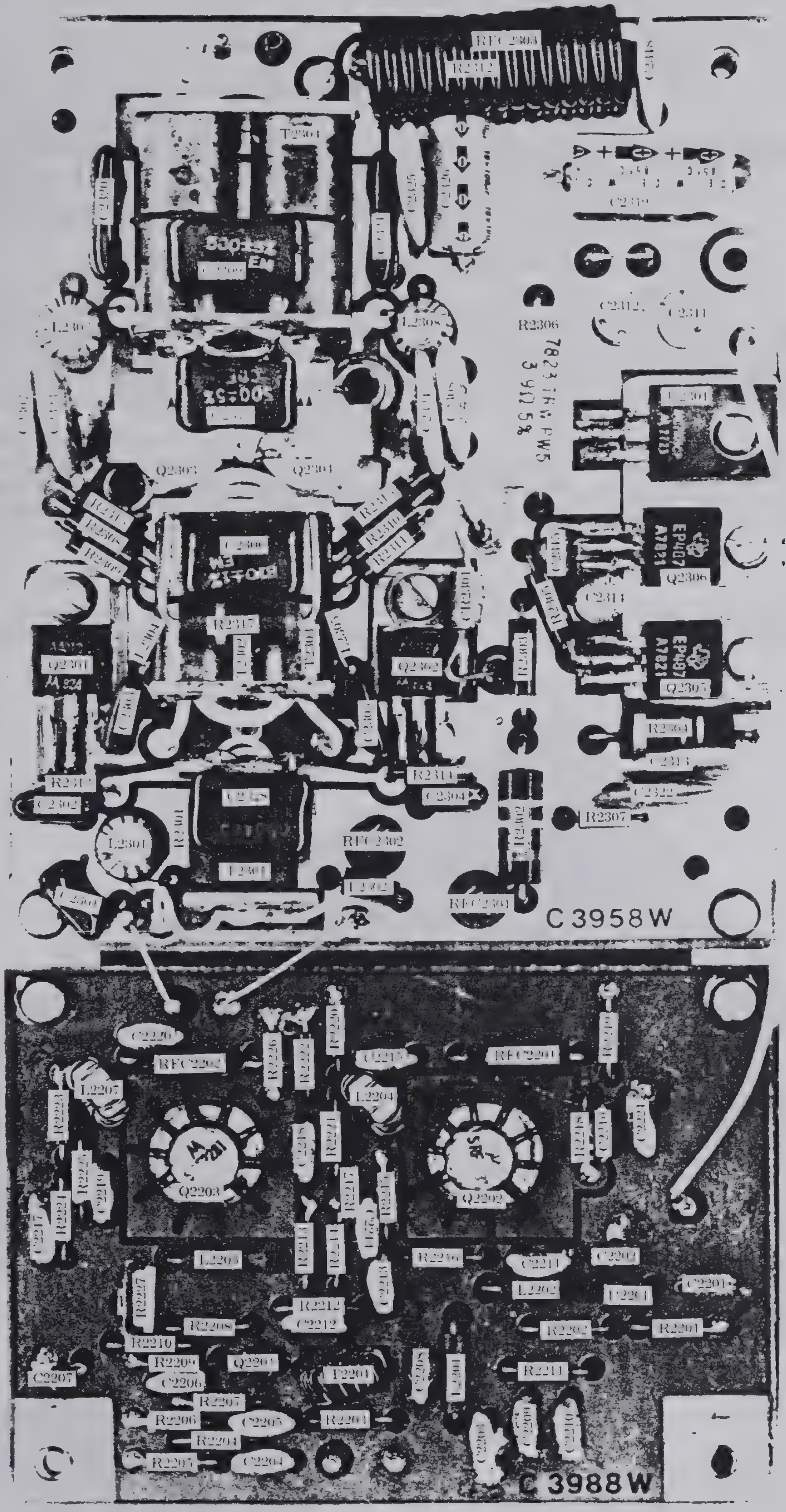


Fig. 2-35 Power Amplifier Module Pictorial

ALL NECESSARY PARTS FURNISHED WITH KIT

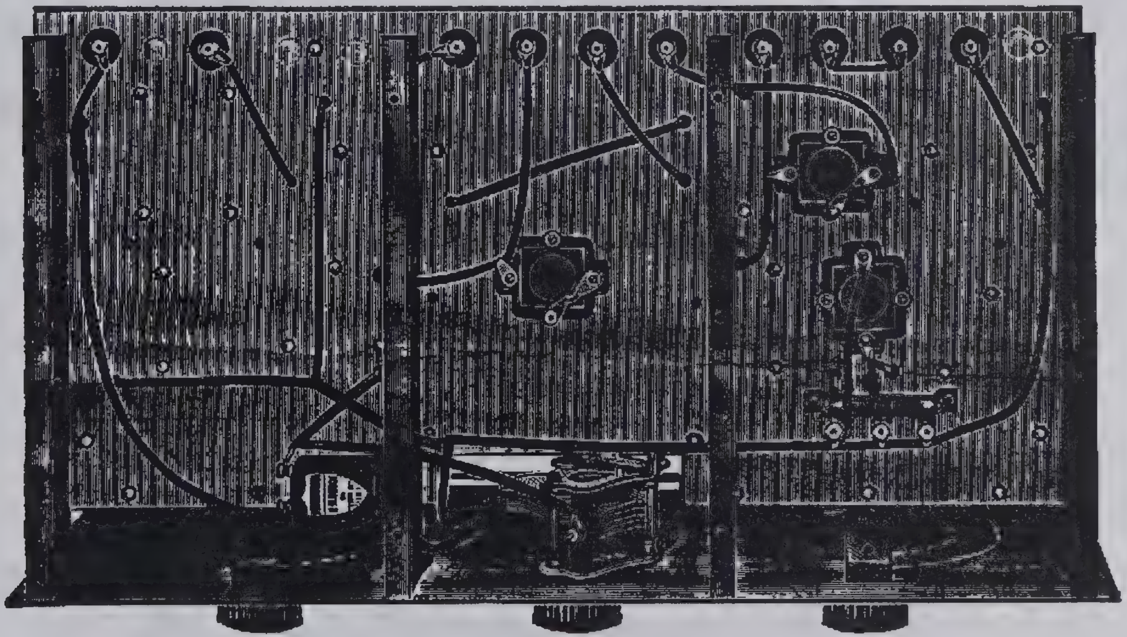
1—No. 1613 .00025-mf. variable condenser, with bakelite knob.
2—No. 1282 illuminated vernier dials.
1—No. 906 rheostat, 6 ohms.
1—No. 961 tapped resistor.
2—No. 600 special Super-Wasp shield cans.
1—No. J5 midget condenser, 5 plates.
2—No. 391 audio amplifying transformers.
2—No. 212 five-prong sockets (for plug-in coils).
2—No. 213 four-prong sockets (for audio tubes).
2—No. 206 four-prong shock-proof sockets (for 222 and detector tubes).
2—Pairs grid-leak clips.
1—No. 758 3-megohm grid leak.
1—No. 750 100,000-ohm grid leak.
1—No. 50B fixed condenser, .0001-mf.
5—No. 59 fixed condensers, .01-mf.
1—No. 130 R.F. choke coil.
2—Sets of plug-in coils, made especially for the Super-Wasp; Nos. 601A and 601D.
4—Packages of hardware, including thirteen binding posts, ten sets of insulating bushings for them, four lengths of spaghetti tubing, 12 feet of tinned copper wire, all necessary nuts, bolts and washers, Mueller clip for connection to screen-grid tube, and six special double-end lugs for mounting of fixed condensers.

STARTING THE ASSEMBLY WORK

The only tools you need in assembling the Super-Wasp are a screwdriver, a pair of long-nosed pliers, and a Spintite wrench to fit the small 6-32 nuts used throughout in the set.

Commence by screwing the sub-panel to the four brackets. Put three ⅜ inch oval head screws through each, using a lock washer and a nut on the under side. The brackets are spaced uniformly along the sub-panel, and you cannot mount them incorrectly because of the accurate drilling of the holes.

Now place the front panel against the upright feet of the brackets, and screw it in place with two nuts per bracket. Again do not fail to place lock washers under the nuts. The panel will now be straight and rigid, and you will be able to work on it comfortably.



What you see when you turn the Super-Wasp over.
Notice how little wiring there is.

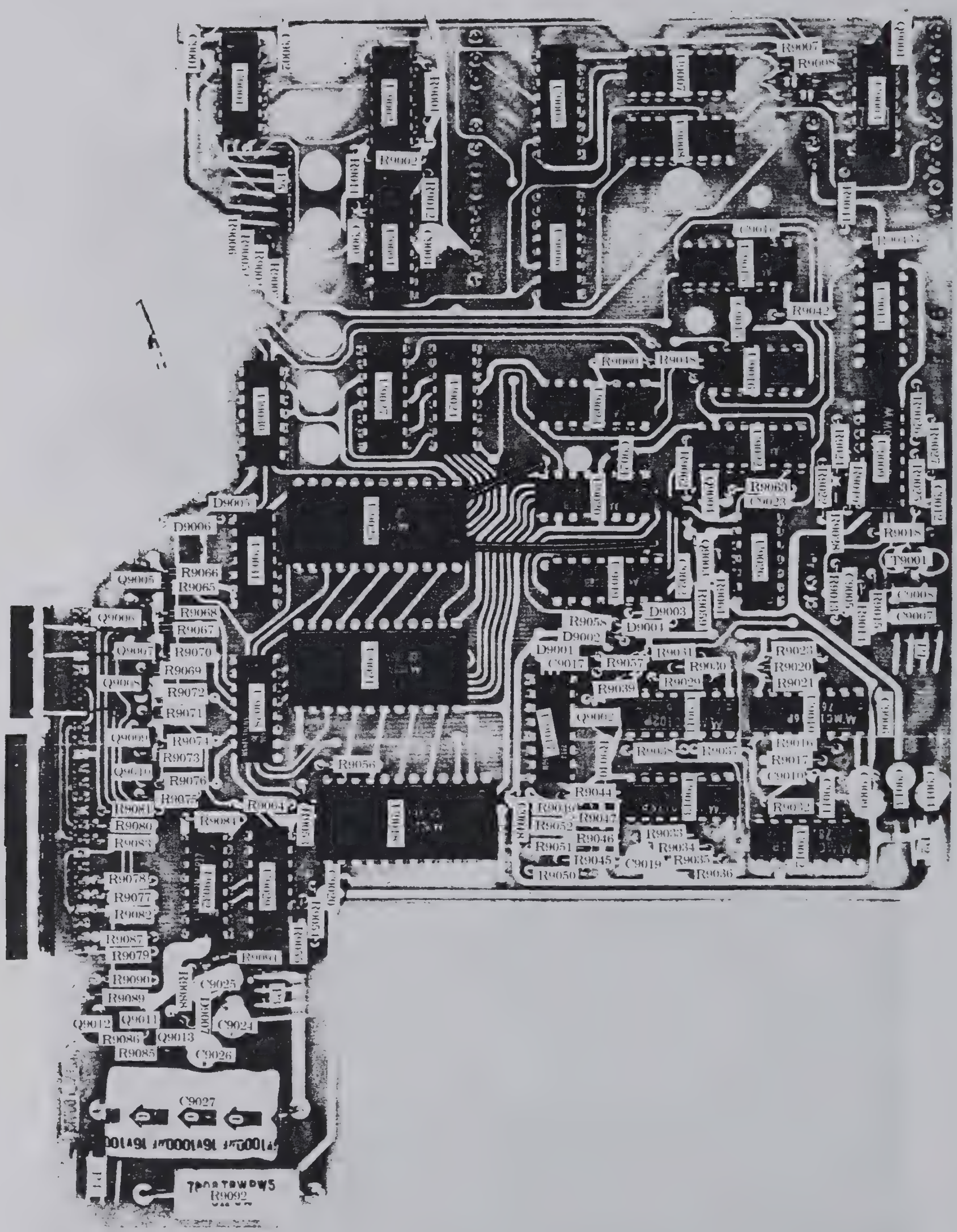
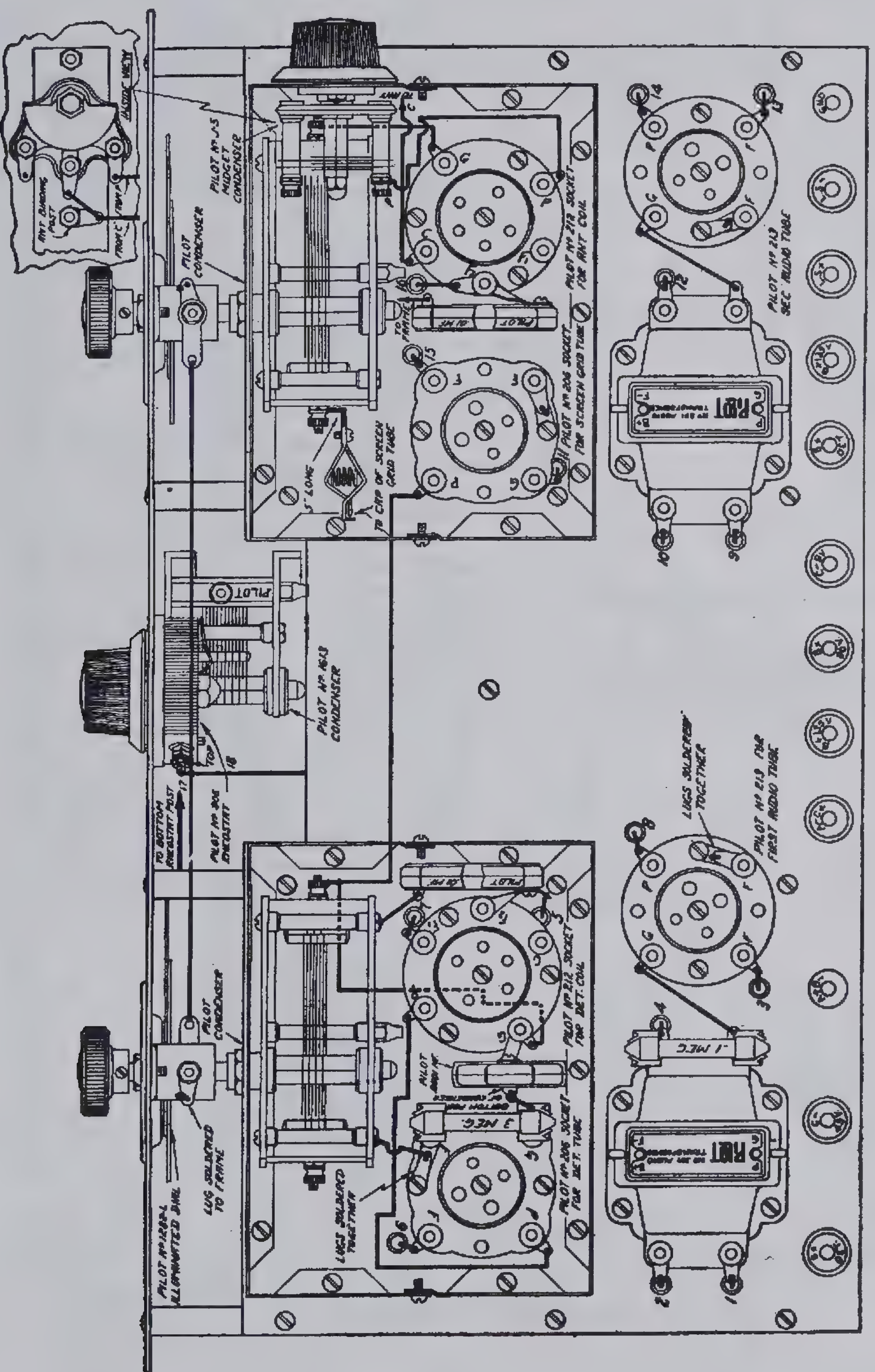


Fig. 4-1 DR-7 Board Pictorial

FRONT AND SUB-PANELS ACCURATELY DRILLED


ANT BINDING POST
FROM C
FROM A
PLASTIC VIEW
PILOT No. J-5 MIDGET CONDENSER
PILOT CONDENSER
ANT
C
PILOT No. 212 SOCKET FOR ANT COIL
PILOT
TO FRAME
15
16
PILOT No. 206 SOCKET FOR SCREEN GRID TUBE
5" LONG
TO CAP OF SCREEN GRID TUBE
PILOT
PILOT No. 1613 CONDENSER
TOP
17
18
TO BOTTOM RHEOSTAT POST
PILOT No. 306 RHEOSTAT
PILOT CONDENSER
LUG SOLDERED TO FRAME
PILOT No. 1282-L ILLUMINATED DIAL
LUGS SOLDERED TOGETHER
3 MEG.
PILOT
PILOT No. 212 SOCKET FOR DET. COIL
PILOT No. 206 SOCKET FOR DET. TUBE
6
14
13
12
PILOT No. 213 SEC. AUDIO TUBE
10
9
LUGS SOLDERED TOGETHER
PILOT No. 213 FOR FIRST AUDIO TUBE
8
4
3
.1 MEG.
2
1
GND

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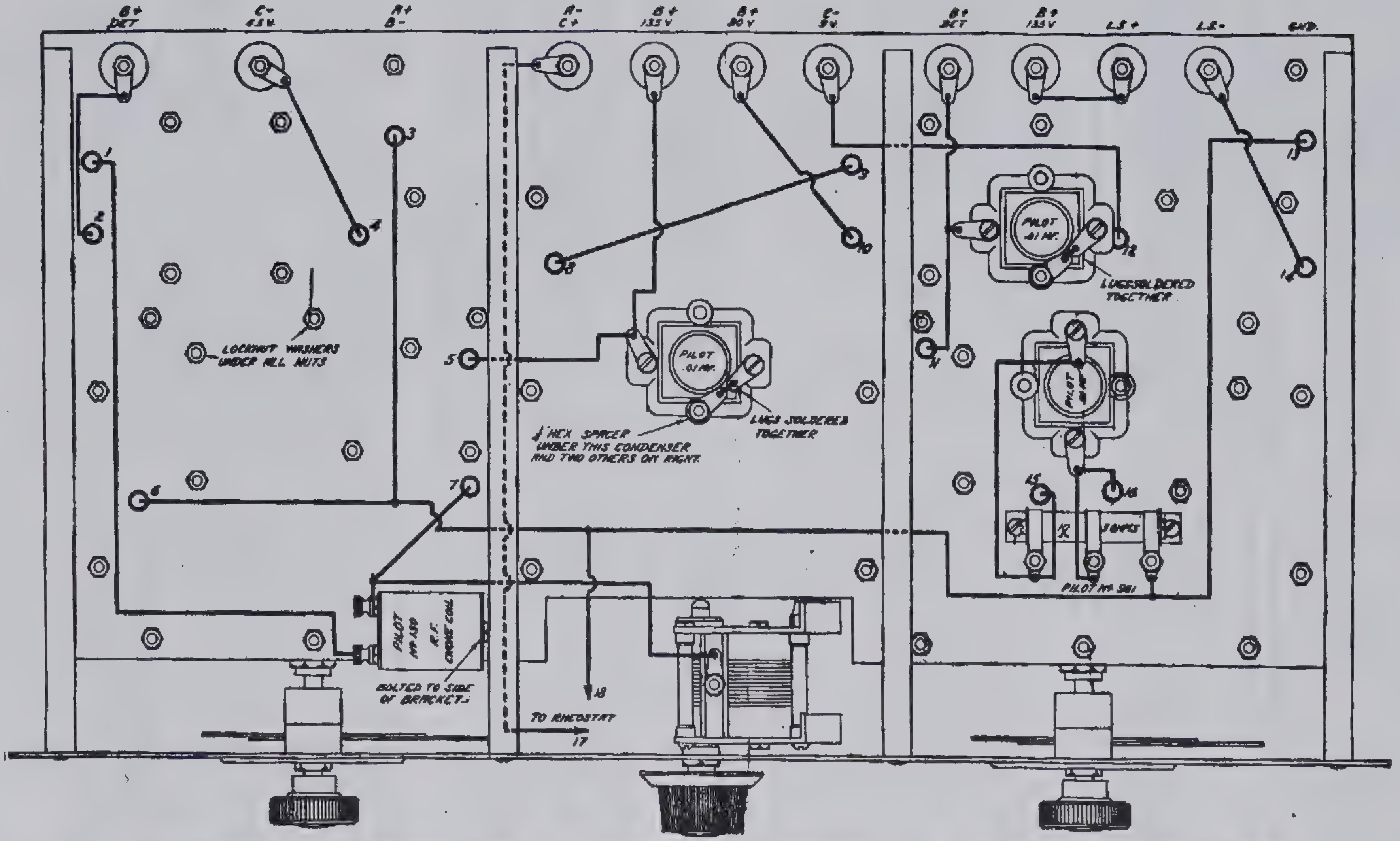


Top and bottom wiring diagrams, showing exact placement of all parts and wiring. Study the location of the parts very carefully before screwing them down; note particularly how the sockets for the plug-in coils are mounted. The blueprint furnished with the Super-Wasp kit shows these two drawings full size.

SECTION 1

INTRODUCTION

1-1. USING THE TR-7 SERVICE MANUAL

This manual is divided into several sections for clarity and ease of use. Each major section is written with the assumption that the preceding portions of the manual have been read and understood by the user.

Section 1 is introductory in nature, and provides a general discussion of operating theory, module location, troubleshooting techniques and tool requirements.

Section 2 contains complete information in each functional element of the TR-7. This information includes detailed circuit description, parts list, component location and schematic diagram. This section of the manual is divided by functional element such as circuit board, module, chassis, etc. for the purpose of rapid circuit, component and problem identification.

Section 3 is a complete alignment procedure for the TR-7, and includes test equipment requirements/recommendations and test point locations.

1-2. LOCATING A MALFUNCTION

The modular design of the TR-7 allows easy exchange of most of the printed circuit boards. All modules are easily removed with the exception of the low-pass and high-pass filter modules, the PTO, and the power amplifier.

The first step in troubleshooting the TR-7 should be isolation of the malfunction to the module or board level. Refer to Section 1-3 for a general discussion of theory of operation and determine which module (or modules) would cause the problem at hand. In most cases, the problem will involve only one board, and substituting a board known to be in good operating condition will easily isolate the problem. Locating problems on the filter modules may require removing these boards from the chassis by removing the bandswitch shaft and unsoldering the harness connections.

Once the problem has been isolated, refer to the appropriate portion of Section 2 for a full scale description of the circuit.

1-3. GENERALIZED THEORY OF OPERATION

The following discussion covers the theory of operation of the TR-7 in a general manner. Detailed circuit descriptions are found in Section 2 of this manual. Refer to figure 1-1 (TR-7 Block Diagram) and figure 1-2 (TR-7 Module Locations) for aid in following this discussion. The discussion is divided into three sections (receiver, transmitter and frequency control) for clarity.

1-3.1 RECEIVER SECTION

Incoming signals from the antenna pass through a bandswitched low-pass filter module, the transmit/receive antenna switching, and a bandswitched high-pass filter module. These filters create an input bandpass filter, the limits of which are defined by the yellow numerals on the front panel BAND switch. A separate receiver and/or receive antenna can be connected in this path by removing the jumper between the EXT RCVR and EXT ANT jacks on the rear panel and making the appropriate connections.

The output of the high-pass filter is connected to the input of the Up-Converter module, along with the VLF antenna input and the 25 kHz calibrator output. The VLF antenna is connected through a 20 dB attenuator due to the fact that the input antenna filters are bypassed by this input. Signals at the input of the Up-Converter module are mixed with the output of the synthesizer VCO to create a 48.05 MHz intermediate frequency (IF) signal. Conversion is accomplished by a high-level, double balanced mixer to provide a very wide dynamic range. The output of this mixer is amplified by a low-noise, high dynamic range junction FET amplifier to insure adequate receiver sensitivity. This stage is followed by a four-pole monolithic 48.05 MHz crystal filter. The purpose of this filter is to attenuate signals removed more than ±4 kHz from 48.05 MHz, thus protecting the remaining stages of the receiver from strong interfering signals. In this manner, optimum receiver dynamic range is preserved while providing excellent sensitivity.

The output of the Up-Converter module is routed to the input of the 2nd mixer module. This module provides additional gain at the 48.05 MHz 1st IF frequency and converts this signal to the 5.645 MHz 2nd IF frequency. Automatic gain control (AGC) voltage is applied to the 1st IF amplifier to supplement the control range supplied by later stages.

READ DIRECTIONS BEFORE STARTING WORK

The first thing to mount on the front panel is the single No. 1613 .00025-mf. variable condenser, which is the regeneration control. This fastens with a single nut. Mount it upright, as shown, so that the rotor plates open out to the left. Put a soldering lug on the bottom stator binding post.

All directions as to right and left will be given with the understanding that the rear edge of the sub-panel is nearest you, as you will do most of the work from the back.

Next comes the rheostat, which fits directly above the regeneration condenser. Break through the two holes in the bakelite base, using a nail or a scriber, so that 6-32 screws ½ inch long can be pushed through. Mount the rheostat with a couple of these screws, keeping it spaced away from the back of the front panel by means of two of the special ¼ inch hex spacers slipped over the mounting screws. The idea of this spacing, and also of the large hole for the shaft, is to insulate the rheostat completely from the panel. Put one soldering lug on the lower binding post, and two on the upper post, one facing down and the other up.

HOW SHIELD CANS ARE MOUNTED

Take the vernier dials and mount them in accordance with the directions included in the packing boxes. Remove the slotted back pieces entirely, as they will not be used. Do not turn in the panel screws and nuts tightly until after you have mounted the variable condensers and the back sections of the shield cans. You will notice that the dial mounting holes in the front panel are slightly oval in shape, to allow the screws to be tightened in the best positions.

Put the covers of the shield cans and their back sections out of the way, as you will not need them until you have assembled and wired the whole set; the back sections will then slip nicely in place, and you will fasten them down to the sub-panel with a few screws.

Mount one of the No. 1611 .00016-mf. condensers on the inside of the shield can that has a small bakelite strip riveted to its right side. Use only the single large mounting nut, and twist the condenser so that the edges of the stator plates lie parallel with the top edge of the can. Mount the J5 midget condenser in the large hole in the bakelite strip, and an "Ant." binding post in the other hole.

Put the shield aside for a moment and mount the No. 961 resistor on the under side of the sub-panel, using two ¼-inch round head screws pushed through from the top side of the sub-panel. It is necessary to do this now because the variable condenser will cover the holes after the shield is mounted in place. These holes for the resistor are near the inside edge of the sub-panel, and you can locate them by studying the picture wiring diagrams closely.

Place the can on the sub-panel so that the shaft of the No. 1611 condenser slides into the mounting stud of the right dial. Screw the can down to the sub-panel using ¼-inch screws through the drilled feet. Turn the dial to 0, pull the condenser plates out until they are entirely unmeshed, and then tighten the set screw in the stud of the dial. Finally, tighten up the screw and the nut that hold the dial on the panel.

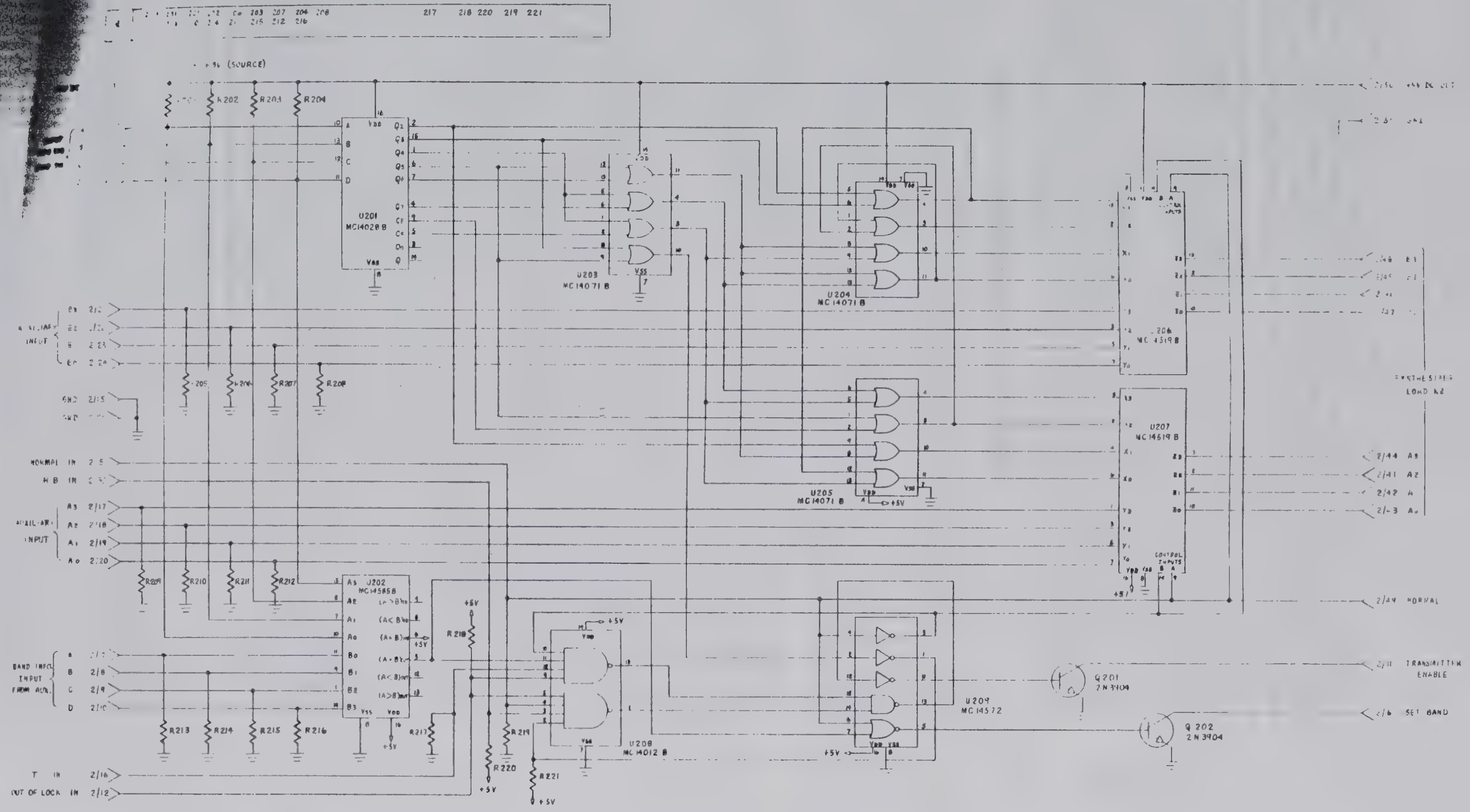
Repeat these operations, except for the detail of the midget condenser, with the other No. 1611 condenser and the other shield can. The mounting of the condensers is really half the work of the set, and if you follow the foregoing directions carefully you will have no trouble.

SPECIAL BUSHINGS FOR COIL SOCKETS

In one of the hardware packages you will find six long 6-32 screws and six hard-rubber bushings one inch long. These are for the mounting of the five-prong sockets, in which the plug-in coils fit. Study the picture wiring diagram closely, and note the way the sockets are placed as regards the binding posts. The actual mounting is easy enough. Simply pass the long screws through the sockets' holes, through the hard-rubber bushings, and then through the sub-panel, fastening them on the under side with lock washers and nuts. Hold the heads of the screws with the screwdriver, and tighten the nuts with the Spintite wrench or the pliers.

The long screw that passes between the two F posts on the five-prong socket for the antenna coils also holds, on the under side of the sub-panel, one of the .01-mf. fixed condensers, which is marked C1 in the blueprint. Slip a ¼-inch hex washer over the end of this screw, place the condenser over it, and then tighten with a nut.

Another of the .01-mf. condensers is fastened and connected directly to the variable condenser and to the F2 post of the five-prong socket in the right-hand can, which houses the components of the antenna or R.F. stage. Put a double-end lug under each terminal screw of the condenser. Bend one lug at right angles and tighten the free end over the short mounting stud on the back of the variable condenser, using a ¼-inch screw. Twist the other lug so that its free end will fit over the F2 socket post, with the condenser standing upright.



NOTE -
ALL RESISTORS ARE 100K Ω, 1/4 W, 10%

Fig. 2-4 Digital Control Board Schematic

Proceed to the left can, and mount another of the .01-mf. condensers in the same manner. One lug goes under the F2 post of the five-prong socket, and the other under the nut that holds the right side of the condenser frame together. (The .0001-mf. grid condenser is similarly mounted between the G post on the elevated socket and the G post on the No. 206 socket next to it.

This method of mounting the blocking and grid condensers practically eliminates wiring in the critical radio-frequency circuits, and is responsible to a great extent for the smooth operation of the Super-Wasp.

Proceed with the assembly work by mounting the three remaining tube sockets. Put a soldering lug under the head of one of the screws going through each socket, as shown in the picture wiring diagram; these lugs are soldered directly to other lugs fastened beneath the F posts, which are thus grounded to the aluminum framework of the set.

Mount the binding posts, using the insulating bushings for all posts except the "A" + "B" —, which is third from the left and "Gnd", which is all the way over on the right. Place soldering lugs beneath the mounting nuts on all the posts except these two, which automatically connect with the framework.

Fasten one pair of the grid-leak clips to the G and F posts of the detector-tube socket, which is in the left can, and the other pair to the G and F posts of one of the audio transformers. Do not mount the transformers yet.

HINTS ON WIRING

Before going any further, do as much wiring inside the shield cans as possible with the audio transformers out of the way. The wire between the P post of the No. 206 socket in the right shield can and the stator post of the variable condenser in the left can passes through holes in the facing sides of the shields. Of course use a piece of spaghetti over the wire to prevent it from short-circuiting against the metal.

The wiring is so exceedingly simple that no detailed explanation of it is necessary. The three variable condensers are automatically grounded to the framework, as is one side of each of the tube sockets. The amount of wiring is thus reduced fully fifty per cent from what it would be with an unshielded set. Wherever a ground symbol is shown in the schematic diagram, it indicates a connection made to any part of the framework.

For the wiring, use the tinned copper wire and the fabric tubing ("spaghetti") furnished with the kit. Solder all connections with a clean, hot iron, and use nothing but rosin-core solder.

After you have wired the sockets and condensers in the shield cans, mount the audio transformers in place, putting the one with the grid leak clips on it in the left position—in back of the detector compartment. Use ½-inch screws through all the transformer holes except the one in the upper right hand corner of the right hand transformer—the one in front of the antenna shield can. Use a 1-inch screw here. Slip a ¼-inch hex washer over its end on the under side of the sub-panel, and then fasten down a .01-mf. condenser (C2 in the blueprint) by means of the same screw. Put a soldering lug under the fastening nut.

The last .01 condenser (C3 in the blueprint) is fastened by means of a separate ½-inch screw in the center of the sub-panel. After doing all this you can complete the wiring in short order.

You will notice that some holes in the sub-panel are fitted with eyelets, and that others are not. The bare holes are for mounting screws, while the eyeletted ones are for connections

The coils for the Super-Wasp. Left, antenna stage coils; right, detector stage coils. They are used in pairs, one in the left-hand can and one in the right.

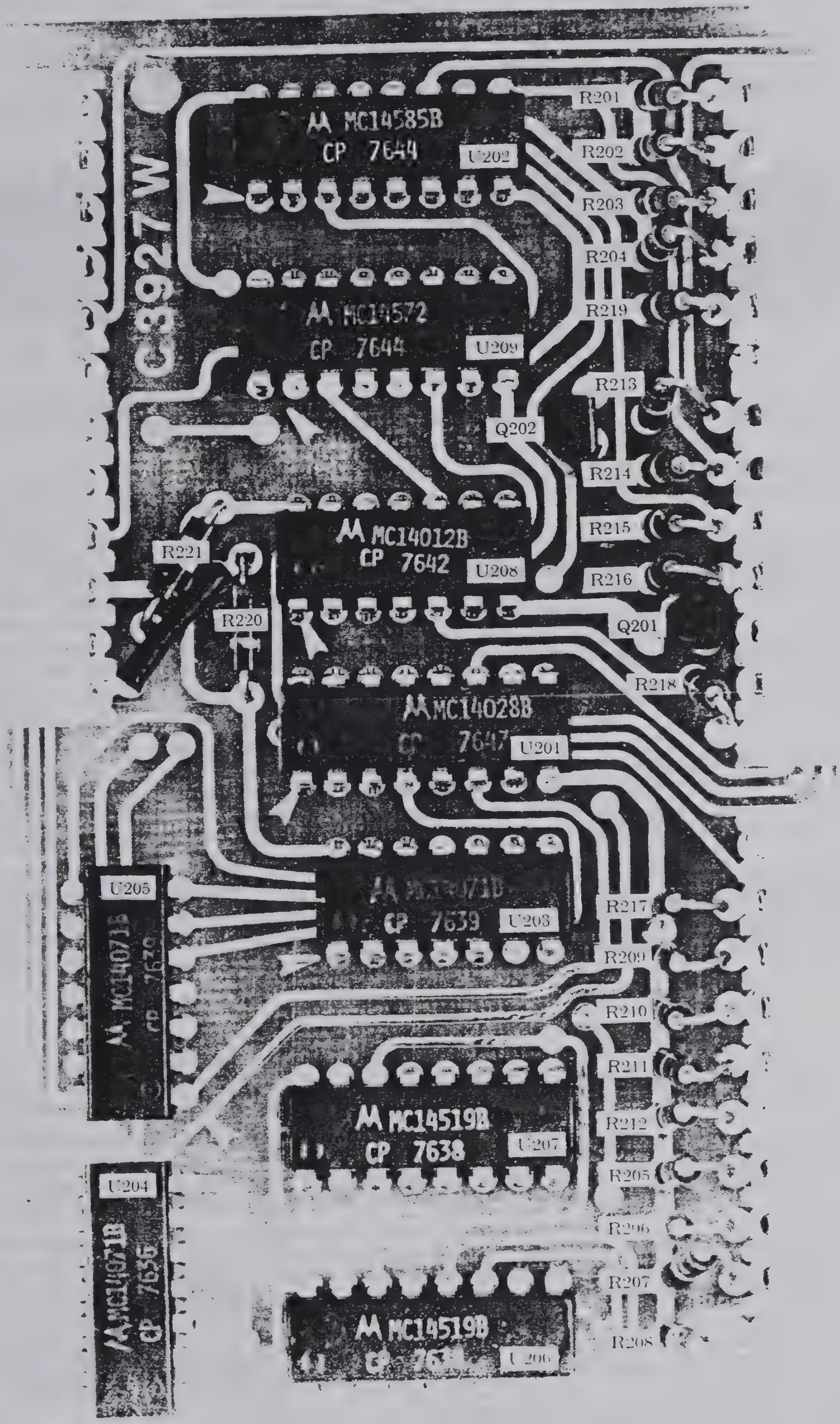


Fig. 2-3 Digital Control Board Pictorial

that pass through the aluminum. The eyelets are not insulated, but provide smooth holes through which the spaghetti can be pushed without being cut.

You will also notice in the picture layouts that the wiring holes are correspondingly numbered in the top and bottom views. This is to help you in locating the holes when you are turning the set upside down during the wiring process.

With all the wiring finished, place the backs of the shield cans in place, and screw them down. Use the very short 6-32 screws for fastening the upright edges together. You are now ready to connect the set to the batteries and to start receiving signals.

However, first make certain that none of the binding posts except the "A" + and the "Gnd" is short-circuited to the sub-panel. Use the old battery-and-phones test.

TWO SETS OF COILS WITH KIT

Two sets of plug-in coils are furnished for the Super-Wasp, one set acting as antenna coils in the R.F. stage and the other as interstage coils between the plate of the screen-grid tube and the grid of the detector. The red, orange, yellow and green ring coils for the antenna position contain only one winding apiece; the blue ring coil, covering the broadcast range, has two windings, a primary above a secondary.

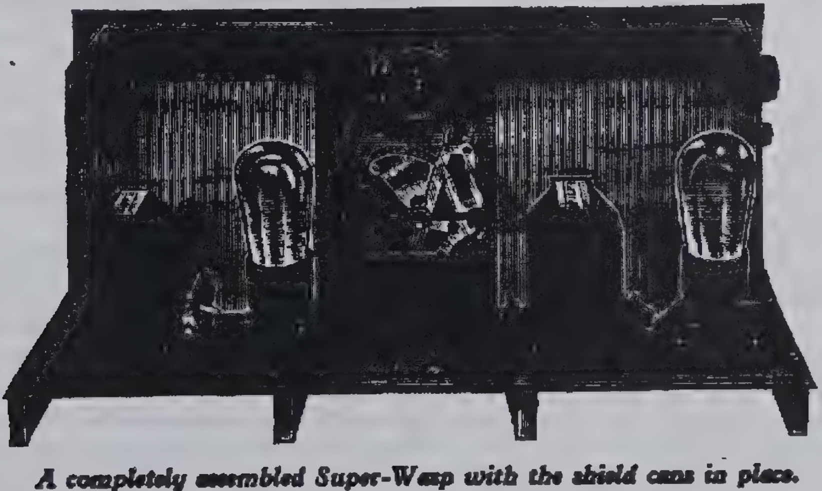
These coils are thus easily distinguished from the detector stage coils, all of which have two windings apiece, a grid winding above a tickler. The coils are always used in pairs; that is, if and orange ring coil is in the first can (the R.F. stage), the other orange ring coil must be used in the detector can.

The tuning ranges of the coils are as follows: 1 Red; 14-27 meters, 21,420 to 11,110 kilocycles. 2 Orange; 26 to 50 meters, 11,540 to 6,000 kilocycles. 3 Yellow; 50 to 100 meters, 6,000 to 3,000 kilocycles. 4 Green; 100 to 200 meters, 3,000 to 1,500 kilocycles. 5 Blue; 200 to 500 meters, 1,500 to 600 kilocycles.

THE TUBES AND BATTERIES

A 222 screen-grid tube is used in the R.F. stage—in the left can. (You are now regarding the set from the front). Tubes of the 201A type are specified for the other positions, but you may also use a 200A as detector, with increased sensitivity by also increased noise level, and either a 112A or a 171A in the second audio stage. You will notice that separate "B" and "C" leads for the plate and grid return leads of both audio stages have been provided, so that you may use any of the three combinations with the correct plate and biasing voltages as specified by the tube manufacturers.

If you use 201A's, run one wire from the 90 volt tap of the "B" batteries to both the first "B" + 135 post (next to the L.S. post) and the "B" + 90 posts; similarly bridge the "C" — 4½ and "C" — 9 posts, and use 4½ volts on both. The "B" + Det. post next to the "C" — 9 post takes 45 volts for the screen-grid of the 222 tube, while the other "B" + 135 post takes this much voltage for the plate of the 222 tube.



A completely assembled Super-Wasp with the shield cans in place. Notice how the A.F. transformers fit behind the cans.

2-3. TRANSMIT EXCITER BOARD

The Transmit Exciter Board amplifies the speech audio from the microphone, provides VOX and anti-VOX circuitry, and includes the 10 volt transmit/receive switching. In addition, this module also contains the transmitter balanced modulator. Refer to figure 2-6 for schematic and figure 2-5 for parts location information.

Microphone audio from the front panel connector is applied to pin 1 of the Transmit Exciter via the Parent Board. This signal is amplified by Q301, Q302 and associated components, and is coupled to pin 21 for connection to the top of the front panel MIC GAIN control. Provisions have been made on the board to jumper the free end of R356 to ground for low impedance microphone input, if required. This jumper is not installed at the factory, and is, in fact, seldom required for proper operation.

The wiper of the front panel MIC GAIN control is connected to pin 22, and coupled to an emitter follower consisting of Q304 and associated components. The output of this stage is coupled to pin 1 of the MC-1496P balanced modulator. The 5.645 MHz carrier signal is coupled to pin 10 of the MC-1496P via a diode switch consisting of CR307 and CR308. In transmit, 10 volts is applied to the anodes of these diodes via R351, causing current to flow via R352 and L301, thus allowing the 5.645 MHz carrier signal to pass. In receive, the diodes are turned off, disabling the balanced modulator. Control R349 is the carrier balance adjustment.

The output of the balanced modulator is taken from pin 6 of the MC-1496P and coupled to a buffer stage consisting of Q309 and associated components. This stage is active only in transmit, thus assuring proper transmitter muting in the receive mode. The double sideband (DSB) signal is then coupled to pin 24 of the Transmit Exciter for routing to the IF Selectivity Board for sideband selection.

Microphone audio from Q302 is also coupled to VOX buffer Q303, and detected by CR305 and CR306. The resulting dc voltage is amplified by U301A, the gain of which is set by the front panel VOX GAIN control connected between module pin 5 and ground. VOX operation is enabled via the VOX override line, pin 4. When this pin is grounded, the output of U301A is shorted, disabling the VOX.

Anti-VOX audio from the speaker is connected via pin 8 to a detector consisting of CR301 and CR302. The dc output of this detector is amplified by U301B, the gain of which is set by the front panel ANTI-VOX GAIN control and connected between module pin 6 and ground.

The VOX signal from U301A is applied to the inverting input of U301C and the ANTI-VOX signal is applied to the non-inverting input of U301C. These signals are compared, and when the VOX signal is greater, the output of U301C is forced low. In the CW mode, a keyed voltage is applied to the inverting input of U301C to achieve the same effect.

The output of U301C is connected to the inverting input of U301D. Thus, when the output of U301C is low, the output of U301D goes high, providing a keying signal. VOX delay is established by C303 and the front panel VOX DELAY control, which is connected between pin 7 and 10 volts. A separate delay control is brought into play on CW, via the MODE switch. R310 is used to establish a minimum delay to insure smooth transmit/receive switching.

The output of U301D is applied to pin 6 of U302. PTT information is appled to pin 1 of U302 via switching transistor Q305. When the transmit enable line (module pin 11) is high, the AND gates in U302 will drive the output switching transistors in this IC to the on state when either the VOX is tripped or the PTT line is grounded.

When either of the output drivers in U302 turn on, base current flows in Q306, thus enabling the 10 volt transmit line (+10T). At the same time, Q308 is turned off, turning off Q307 and disabling the 10 volt receive line (+10R). When the output drivers of U302 are off (caused by the absence of a VOX or PTT signal), exactly the opposite is true. In this manner, pin 15 (+10R) and pin 16 (+10T) are controlled for transmit/receive switching throughout the remainder of the radio. The network consisting of R362, C324, CR309 and CR310 provides a fast turnoff/delayed turn on signal to the base of Q308 to eliminate any possible critical sequencing problems in the T/R switching circuitry.

It should be noted that switches Q306 and Q307 do not have any current limiting protection, since +10R and +10T must be well regulated. As a result, if a short is developed within the radio on either the +10R or +10T lines, the accompanying switching transistor will probably be destroyed. Care should be taken to avoid such shorts when servicing the TR-7.

TUNING TRICKS EASILY LEARNED

The tuning of the Super-Wasp is like that of any straight regenerative receiver, except that there are two tuning dials to handle instead of one. This sounds like a lot of work, but in reality it isn't. During the first few evenings you are bound to fumble a bit with the controls, and perhaps you won't bring in those foreign stations so quickly. Have a little patience; remember that it took you more than one day to learn how to drive your car.

REGENERATIVE ACTION IMPORTANT

The success of the receiver will depend to a great extent on how smoothly you can make the detector tube regenerate. In general, use as little plate voltage as possible. Start off by connecting the "B" + detector post on the extreme right to 22½ volts, and see how the set regenerates on the various coils. Operating conditions are just right when the set goes into oscillation at the high end of any pair of coils with the regeneration condenser (the center one) all the way in. Sometimes the regeneration is fine up to about 80 on the dials, but stops there. An increase in the detector "B" voltage from 22½ to 45 will invariably cure this, but with this higher value the regenerative action is likely to be too violent. Tubes vary a great deal, and if the particular ones you have seem to require some value between 22½ and 45, simply connect a PILOT Resistograd in the "B" + detector wire, with the latter running to 45 volts. By adjusting the Resistograd you will be able to strike a voltage that will be just right for your own tubes.

The two tuning dials will run more or less alike, except at the very high and very low ends of the scales. For the full 0-100 range on the detector condenser (the right hand one) the R.F. condenser will usually run from 10 to 90 or 95. The size of the individual aerial affects this relationship. It is virtually impossible to make the dials read exactly alike, because of the different capacities and inductances associated with the R.F. and the detector circuits.

The setting of the midget condenser (on the side of the left shield can) is a matter of experiment, and will be different for different aerials. It is also different for the different coils. The positions found best by trial can be marked right on the can with pencil lines.

In hunting for short-wave broadcasting stations, remember that the tuning is going to be very sharp, and you will skip right by many powerful stations if you do not proceed carefully. If you start listening some evening after 8.00 p.m., plug in the yellow ring coils first, as you can practice tuning by getting W8XK, the 63-meter short-wave transmitter of KDKA, which is an old stand-by. Set the right hand dial at about 20, the left at about 25, and turn up the regeneration condenser until you hear the tell-tale rushing sound indicative of regeneration. Move the dials up or down a degree at a time until you hear a loud whistle. Tune in the whistle as loud as you can, and then start backing down the regeneration condenser. Juggle the tuning dials back and forth a trifle at the same time, and eventually you will be able to clear the whistle and hear the voice or music. If the signals are very weak, you may have to "zero beat" them. This is the operation of throwing the detector into oscillation, obtaining the whistle, and then tuning the set so carefully that the voice comes through just as the whistle disappears. It will reappear if the detector condenser is turned either up or down. Zero-beating is a very effective method of bringing in weak broadcasting stations, although it requires some experience in tuning. You will be able to master the trick after a few evenings.

GETTING THE FOREIGN STATIONS

In going after foreign broadcasting stations, you must bear in mind the time differences between the United States and the other countries of the world. Station 5SW, in Chelmsford, England, for instance, signs off at 7.00 p.m. Eastern Standard Time, it then being midnight in London. Thousands of short-wave set owners tune in this station regularly week days, and use its programs as dinner music. Station PCJ, in Holland, the star short-wave performer, is likely to be heard almost any time, as it puts on special programs for different countries of the world. It usually starts at about 10.30 p.m. Eastern time, and comes in with fine loud speaker strength. For the Australian stations you have to be an early riser—or a victim of insomnia—for they roll in toward about five o'clock in the morning.

The Super-Wasp will bring in these stations, if you listen for them at the right time and tune for them carefully. Don't expect to hear them all at once during one hour of listening after supper. Give the set a chance, learn how to use it properly, and you will obtain a million dollars worth of sport out of it. When your neighbor boasts about hearing the West Coast or the East Coast with his seven-tube, $200 broadcast receiver, you will be able to smile at him in a superior manner and say, "Huh, that's nothing; I get Holland on a four-tube set that costs me only thirty dollars."

TR-7 TRANSMIT EXCITER BOARD

REF DES	DESCRIPTION	PART NO.
C301	Capacitor, Electrolytic, 1 μF ± 20%, 50 V	3180008
C302	Capacitor, Electrolytic, 1 μF ± 20%, 50 V	3180008
C303	Capacitor, Electrolytic, 1 μF ± 20%, 50 V	3180008
C304	Capacitor, Disc, .01 μF + 80%, M25V	3161500
C305	Capacitor, Electrolytic, 1 μF ± 20%, 50 V	3180008
C306	Capacitor, Electrolytic, 1 μF ± 20%, 50 V	3180008
C307	Capacitor, Disc, .05 μF + 80%, M16V	3161600
C308	Capacitor, Disc, 68 pF, N750	3160990
C309	Capacitor, Tantalum, .22 μF ± 10%, 35 V	3183100
C310	Capacitor, Tantalum, .22 μF ± 10%, 35 V	3183100
C311	Capacitor, Disc, 470 pF ± 20%, Z5U	3161350
C312	Capacitor, Electrolytic, 10 μF ± 20%, 25 V	3180062
C313	Capacitor, Electrolytic, 1 μF ± 20%, 50 V	3180008
C314	Capacitor, Tantalum, .22 μF ± 10%, 35 V	3183100
C315	Capacitor, Tantalum, 1 μF ± 20%, 35 V	3183010
C316	Capacitor, Disc, .01 μF ± 80%, M25V	3161500
C317	Capacitor, Electrolytic, 22 μF ± 20%, 16 V	3180105
C318	Capacitor, Disc, .005 μF ± 20%, Z5U	3161470
C319	Capacitor, Disc, .005 μF ± 20%, Z5U	3161470
C320	Capacitor, Electrolytic, 22 μF ± 20%, 16 V	3180150
C321	Capacitor, Electrolytic, 1 μF ± 20%, 50 V	3180008
C322	Capacitor, Disc, .01 μF + 80%, M25V	3161500
C323	Capacitor, Disc, .01 μF + 80%, M25V	3161500
C324	Capacitor, Electrolytic, 1μF ± 20%, 50 V	3180008
C325	Capacitor, Disc, .01 uF + 80%, M25V	3161500
C326	Capacitor, Disc, .001 μF ± 20%, Z5U	3161380
C327	Capacitor, Disc, .005 μF ± 20%, Z5U	3161470
C328	Capacitor, Electrolytic, 10 μF ± 20%, 25 V	3180062
C329	Capacitor, Disc, .01 μF + 80%, M25V	3161500
C330	Capacitor, Disc, .01 μF + 80%, M25V	3161500
CR301	Diode, 1N270	3020010
CR302	Diode, 1N270	3020010
CR303	Diode, 1N270	3020010
CR304	Diode, 1N270	3020010
CR305	Diode, 1N270	3020010
CR306	Diode, 1N270	3020010
CR307	Diode, 1N4148	3020090
CR308	Diode, 1N4148	3020090
CR309	Diode, 1N4148	3020090
CR310	Diode, 1N4148	3020090
Q301	Transistor, MPS-6521	3030289
Q302	Transistor, 2N3904	3030105
Q303	Transistor, 2N3904	3030105
Q304	Transistor, 2N3904	3030105
Q305	Transistor, 2N3904	3030105
Q306	Transistor, 2N4402	3030120
Q307	Transistor, 2N4402	3030120
Q308	Transistor, 2N3904	3030105
Q309	Transistor, 2N3563	3030060
R301	Resistor, Carbon Film, 510 Ω ± 5%, 1/4 W	3220115
R302	Resistor, Carbon Film, 1.0 KΩ ± 5%, 1/4 W	3220160

PLENTY OF STATIONS TO HEAR

SHORT-WAVE BROADCASTING STATIONS OF THE WORLD

(Figures on right are wavelengths in meters.)

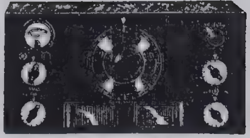
		AFRICA		
AIN		Casablanca, Morocco	51.00	
8KR	2	Constantine, Tunis	42.80	
JB	2	Johannesburg, South Africa	32.00	
7LO	2	Nairobi, Kenya	35.00	
		AUSTRALIA		
2BL	2	Sydney	32.50	
2FC	2	Sydney	28.50	
2ME	2	Sydney	28.50	
3AR	3	Melbourne	55.00	
3LO		Melbourne	32.00	
6AG	2	Perth, West Australia	32.90	
6WF	4	Perth	104.50	
		AUSTRIA		
[illegible]	3	Vienna	70,00	
EATH	1	Vienna	37,00	
	1	Vienna	22.20	
		BELGIUM		
EB4AS	2	Brussels	42.00	
		BRAZIL		
SQBE	1	Bahia	24.00	
	2	Para	34.00	
		CANADA		
CF		Drummondville, Quebec	32.00	
CJRX	1	Winnipeg, Man.	25.60	
VAS	2	Louisburg, N. S.	28,00	
		COSTA RICA		
NRH	2	Heredia	[illegible]	
		DANTZIG		
EK4ZZZ	2	Dantzig	40.00	
		DENMARK		
D7MK	2	Copenhagen	32.05	
D7RL	2	Copenhagen 42.12 and	84.24	
		ENGLAND		
5SW		Chelmsford	24.30	
2NM		Caterham	32.50	
GBS	2	Rugby	24.40	
		FINLAND		
	3	Helsingfors (Helsinki)	31.50	
		FRANCE		
F8GC	3	Paris ("Radio LL")	61.00	✓
F8AV		Nogent	80.00	✓
Radio Vitus	2	Paris	37.00	
Eiffel Tower		Paris (time signals)	32.50	
YR	2	Lyons ("Radio Lyon")	40.20	
		Agen	30.75	
YN		Lyons	58.00	✓
		Nancy	15.30	
FW4	1	Ste. Assise	24.50	
		GERMANY		
AFI		Konigswusterhausen	14.00	
AFL	3	Hamburg 70.00 and	52.00	✓
AFT		Konigswusterhausen	14.00	
AFU		Konigswusterhausen	14.00	
AFK	3	Berlin (Doberitz) 37.65	67.65	
HEA		Nauen	11.00	
AGC		Berlin	17.20	
AGJ	3	Nauen	56.70	✓
AGK		Nauen	11.00	
LA		Langenberg	43.90	
POF		Nauen	11.00	
POZ		Nauen	18.10	
	2	Stuttgart	41.00	
		HOLLAND		
PCJ	2	Eindhoven	31.4	
PCK	1	Kootwijk	16.00	
PCL	1	Kootwijk	18.00	
PCMM	2	Ymuiden	46.50	
PCPP	1	Kootwijk	16.50	
PCRR	2	Kootwijk	37.00	
PCTT	1	Kootwijk	21.00	
PCUU	2	The Hague	37.00	
		ITALY		
I1AX	1-2	Rome 20.00,	40.00	
IAY	1-2	Placenza 20.00,	45.00	
		JAPAN		
JFAB	2	Taipeh, Formosa	39.50	
JHBB	2	Ibarakiken (Hiraiso)	37.50	
JIPP		Tokio	20.00	
JKZB		Tokio	20.00	
JOAK	2-3-2	Tokio 30.00, 60.00, 35.00,	70.00	
IAA	2	Iwatsuki	40.00	

	JAVA		
ANE	Bandoeng 15.93,	31.26	1-2
	Surabaya	140	4
	MEXICO		
XC51	Mexico City	44.00	2
	MOROCCO		
AIN	Casablanca	51.00	3
	NORWAY		
LCHO	Oslo	33.00	2
LGN	Bergen 31.25,	30.00	2
	U. S. S. R. (RUSSIA)		
RDRL	Leningrad	28.50	3
RDW	Moscow	83.00	✓ 3
RFM	Khabarovsk (Siberia)	70.20	✓ 3
RFN	Moscow	50.00	2
RA19	Tomsk (Siberia)	37.00	2
	SPAIN		
EAM	Madrid	30.70	2
EAR58	Barcelona		
	SWEDEN		
SAS	Karlsborg	52.50	✓ 3
SAA	Karlskrona	44.40	2
	Motala	41.45	2
SAJ	Karlsborg	47.00	2
SMHA	Stockholm	41.00	2
	SWITZERLAND		
H9OC	Berne	32.00	2
H9XD	Zurich 85.00 and	32.00	2
	UNITED STATES		
KDKA (W8XK)	East Pittsburgh, Pa.	62.50	✓ 3
	W8XS, W8XP-portable	42.79	
KEJK (W6XAN)	Los Angeles, Calif.	105.90	4
KEWE	Bolinas, Calif.	14.10	4
KFPY (W7XAB)	Spokane, Washington	105.90	4
KFQU W6XBH)	Holy City, Calif.	31.00	4
KFQZ (W6XBH)	Hollywood, Calif.	108.20	4
KFVD (W6XBX)	Culver City, Calif.	105.00	4
KFWB (W6XBR)	Los Angeles, Calif.	105.00	4
		40.00	4
KFWO (W6XAD)	Avalon, Calif.	53,07	✓ 3
KGER (W6XBV)	Long Beach, Calif.	48.86	2
KGB	San Diego, Calif.	65.18	✓ 3
KGDE	Barrett, Minn.	40.00	2
KGO (W6XAX, W6XN)	San Francisco, Calif.	10 to 40.	4
KHJ (W6XAU)	Los Angeles, Calif.	104.10	4
KJBS (W6XAR)	San Francisco, Calif.	61.00	✓ 3
KJR (W7XC, W7XO)	Seattle, Washington	105.20	4
KMOX	St. Louis, Mo.	49.00	4
KMTR	Los Angeles, Calif.	108.20	4
KNRC (W6XAF)	Santa Monica, Calif.	108.20	4
KNX (W6XA)	Los Angeles, Calif.	107.10	4
KOIL (W9XU	Council Bluffs, Iowa	61.06	✓ 3
KWE-KEWE	Bolinas, Calif.	14.40	4
KWJJ (W7XAO)	Portland, Oregon	53.50	3
WAAM (W2XBA)	Newark, N. J.	65.18	✓ 3
WABC (W2XE)	Richmond Hill, N. Y.	58.50	✓ 3
WAJ	Rocky Point, N. Y.	22.48	
WBRL (W1XY)	Tilton, N. H.	109.00	4
WBZ	Springfield, Mass.	70.00	✓ 3
WCEL	Chicago, Ill.	37.24	
WCGU (W2XBH)	Brooklyn, N. Y.	54.00	✓ 3
WCSH (W1XAB)	Portland, Maine	63.7[illegible]	
WCX	Pontiac, Mich.	[illegible]	
WEAJ	Rocky Point, N. Y.	22.48	
WEAO (W8XJ)	Columbus, Ohio	54.02	
WGY (W2XAF)	Schenectady, N. Y.	31.40	
(W2XAD)	Schenectady, N. Y.	21.96	
		5.00	
WHK (W8XF)	Cleveland, Ohio	66.04	✓ 3
WJR-WCX (W8XAO)	Pontiac, Michigan	32.00	
WIZ	New Brunswick, N. J.	43.45	
WJZ (W3XL)	New York, N. Y.	59.96	✓
WLW (W8XAL)	Cincinnati, Ohio	52.02	✓ 3
WNAL (W9XAB)	Omaha, Neb.	105.00	
WNBT	Elgin, Ill. (Time Signals)	35.50	
WND	Ocean Township, N. J.	46.48	
WOR (W2XAQ)	Kearny, N. J.	65.40	✓
WOWO	Fort Wayne, Ind.	22.80	
WRNY (W2XAL)	New York, N. Y.	30.91	
WSM (4XD)	Nashville, Tenn.	31.45	3
WTFF	Mt. Vernon, Va.	56.00	✓ 3

Printed in U. S. A.

REF DES	DESCRIPTION	PART NO.
R303	Resistor, Carbon Film, 10 KΩ ± 5%, 1/4 W	3220235
R304	Resistor, Carbon Film, 100 KΩ ± 5%, 1/4 W	3220315
R305	Resistor, Carbon Film, 2.2 KΩ ± 5%, 1/4 W	3220190
R306	Resistor, Carbon Film, 100 KΩ ± 5%, 1/4 W	3220315
R307	Resistor, Carbon Film, 22 KΩ ± 5%, 1/4 W	3220260
R308	Resistor, Carbon Film, 10 KΩ ± 5%, 1/4 W	3220235
R309	Resistor, Carbon Film, 2.2 KΩ ± 5%, 1/4 W	3220190
R310	Resistor, Carbon Film, 47 KΩ ± 5%, 1/4 W	3220285
R311	Resistor, Carbon Film, 1.0 MΩ ± 5%, 1/4 W	3220355
R312	Resistor, Carbon Film, 4.7 KΩ ± 5%, 1/4 W	3220210
R313	Resistor, Carbon Film, 6.8 MΩ ± 5%, 1/4 W	3220375
R314	Resistor, Carbon Film, 2.2 MΩ ± 5%, 1/4 W	3220360
R315	Resistor, Carbon Film, 10 Ω ± 5%, 1/4 W	3220005
R316	Resistor, Carbon Film, 3.3 KΩ ± 5%, 1/4 W	3220200
R317	Resistor, Carbon Film, 100 KΩ ± 5%, 1/4 W	3220315
R318	Resistor, Carbon Film, 100 KΩ ± 5%, 1/4 W	3220315
R319	NOT USED	
R320	Resistor, Carbon Film, 10 KΩ ± 5%, 1/4 W	3220235
R321	Resistor, Carbon Film, 10 KΩ ± 5%, 1/4 W	3220235
R322	Resistor, Carbon Film, 10 Ω ± 5%, 1/4 W	3220005
R323	Resistor, Carbon Film, 10 KΩ ± 5%, 1/4 W	3220235
R324	Resistor, Carbon Film, 1.0 KΩ ± 5%, 1/4 W	3220160
R325	Resistor, Carbon Film, 100 KΩ ± 5%, 1/4 W	3220315
R326	Resistor, Carbon Film, 47 Ω ± 5%, 1/4 W	3220035
R327	Resistor, Carbon Film, 150 KΩ ± 5%, 1/4 W	3220320
R328	Resistor, Carbon Film, 2.2 MΩ ± 5%, 1/4 W	3220360
R329	Resistor, Carbon Film, 33 KΩ ± 5%, 1/4 W	3220275
R330	Resistor, Carbon Film, 1.0 KΩ ± 5%, 1/4 W	3220160
R331	Resistor, Carbon Film, 330 KΩ ± 5%, 1/4 W	3220340
R332	Resistor, Carbon Film, 2.2 KΩ ± 5%, 1/4 W	3220190
R333	Resistor, Carbon Film, 180 Ω ± 5%, 1/4 W	3220070
R334	Resistor, Carbon Film, 18 KΩ ± 5%, 1/4 W	3220255
R335	Resistor, Carbon Film, 10 KΩ ± 5%, 1/4 W	3220235
R336	Resistor, Carbon Film, 1.5 KΩ ± 5%, 1/4 W	3220175
R337	Resistor, Carbon Film, 100 Ω ± 5%, 1/4 W	3220055
R338	Resistor, Carbon Film, 1.0 KΩ ± 5%, 1/4 W	3220160
R339	Resistor, Carbon Film, 10 KΩ ± 5%, 1/4 W	3220235
R340	Resistor, Carbon Film, 3.3 KΩ ± 5%, 1/4 W	3220200
R341	Resistor, Carbon Film, 3.3 KΩ ± 5%, 1/4 W	3220200
R342	Resistor, Carbon Film, 820 Ω ± 5%, 1/4 W	3220145
R343	Resistor, Carbon Film, 100 Ω ± 5%, 1/4 W	3220055
R344	Resistor, Carbon Film, 330 Ω ± 5%, 1/4 W	3220090
R345	Resistor, Carbon Film, 10 KΩ ± 5%, 1/4 W	3220235
R346	Resistor, Carbon Film, 1.0 KΩ ± 5%, 1/4 W	3220160
R347	Resistor, Carbon Film, 330 Ω ± 5%, 1/4 W	3220090
R348	Resistor, Carbon Film, 10 KΩ ± 5%, 1/4 W	3220235
R349	Resistor, Variable 25 KΩ	3260670
R350	Resistor, Carbon Film, 330 Ω ± 5%, 1/4 W	3220090
R351	Resistor, Carbon Film, 1.0 KΩ ± 5%, 1/4 W	3220160
R352	Resistor, Carbon Film, 56 Ω ± 5%, 1/4 W	3220040
R353	Resistor, Carbon Film, 330 Ω ± 5%, 1/4 W	3220090
R354	Resistor, Carbon Film, 10 KΩ ± 5%, 1/4 W	3220235
R355	Resistor, Carbon Film, 10 KΩ ± 5%, 1/4 W	3220235
R356	Resistor, Carbon Film, 680 Ω ± 5%, 1/4 W	3220140

THE COMMUNICATIONS RECEIVER



EDITED BY **WILLIAM FIZETTE, W2DGB**, RR 1, BOX 1634, HENRYVILLE, PA 18332
E-MAIL: w2dgb@arrl.net. *PLEASE INCLUDE SASE FOR REPLY.*

Replicating the Pilot Wasp Short-Wave Receiver

By H. Paul Bohlander, W3VVS

Paul Bohlander, a long-time amateur and renowned craftsman, returns to our column to report on an interesting recent project: the replication of an early Pilot Wasp receiver, the predecessor to the famous Pilot Super-Wasp. Pilot parts still show up at flea markets, and with time a kit of parts can be assembled to build this little radio. Read on.—wf

As a teenager during the early 1930s I built many one- and two-tube receivers using 201As, winding the coils on old four-prong tube bases. My cousin Carl, who was more advanced in the hobby, observed my efforts with these crude breadboard receivers. He decided to loan me a Pilot Super-Wasp K-110 battery receiver that he had built from a kit. The set used a 222 screen-grid tube as an RF amplifier and three 201As (a regenerative detector and two audio stages). In 1928 his kit had cost him $29.50.

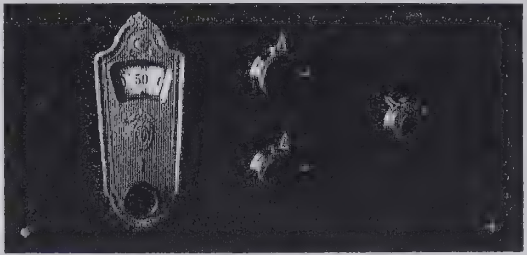
I used the set for several months and was impressed both with its operation and the beautiful plug-in coils with their colored Bakelite handles. Eventually I had to return the receiver to my cousin. Later I found out that his wife had thrown the Super-Wasp out with the trash! However, the memory of the receiver stayed with me throughout the years.

Moving forward in time, Bruce Kelley's 1929 QSO party caught my interest after I became an AWA member and I participated with my Hartley oscillator each year. During the 1987 contest I worked W3OER, Jim Haube, who was using a 1928 Pilot Wasp receiver, the forerunner of the Pilot Super-Wasp.

Jim was kind enough to send me not only photos of his Wasp, but also a copy of the 1928 Pilot Radio house publication, *Radio Design*, edited by Milton B. Sleeper. Included in the material was a description of the receiver, as written by John Geloso. Included were construction details, a parts list, schematics, and some photographs.

The following year, at the AWA Conference, I was fortunate enough to purchase a Pilot illuminated vernier dial, part No. 1282, from that well-known old-timer, Fran "Cuz" Thiese, W2BJI. This was the beginning of my 17-year hunt for the Pilot-brand parts needed to replicate a Wasp receiver. I kept my eye out for variable capacitors, tube sockets, knobs, coils, and audio transformers. (For some unknown reason, the Pilot RF choke, part No. 130, was not on the original list.)

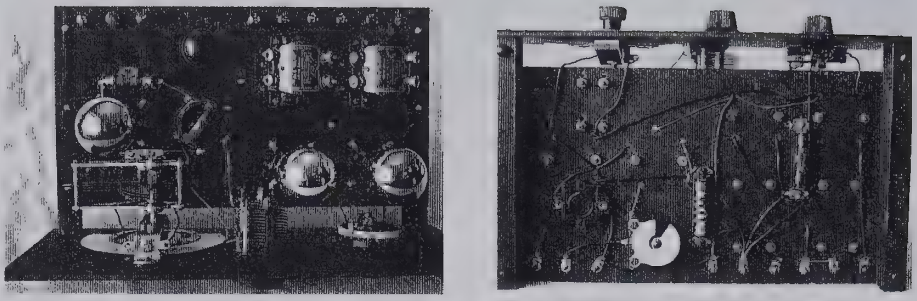
Unfortunately I was never able to acquire the Pilot audios, but substituted All American audio transformers, manufactured by the Rauland Mfg. Co. Also difficult to find were the distinctive original five-prong coil forms with the multi-colored handles. Five coils covered the range of 17 to 500 meters:



Wood grain Masonite for front panel, salvaged from TV console cabinet, closely resembles original Micarta.

Red ....17-30 meters
Orange .....30-52 meters
Yellow .....45-105 meters
Green ....93-203 meters
Blue ....200-500 meters

An interesting feature was the special 200- to 500-meter broadcast coil, which had a primary antenna winding. The other coils, intended for the short waves, did not have this winding. They were connected directly to the antenna through a small variable capacitor. The Wasp coils were widely recognized for their quality and unique design, and were used in many receivers, including some of the short-wave sets designed for the Richard Byrd South Pole Expedition.



Top and bottom views of replica show off author's skill at duplicating period construction practices.

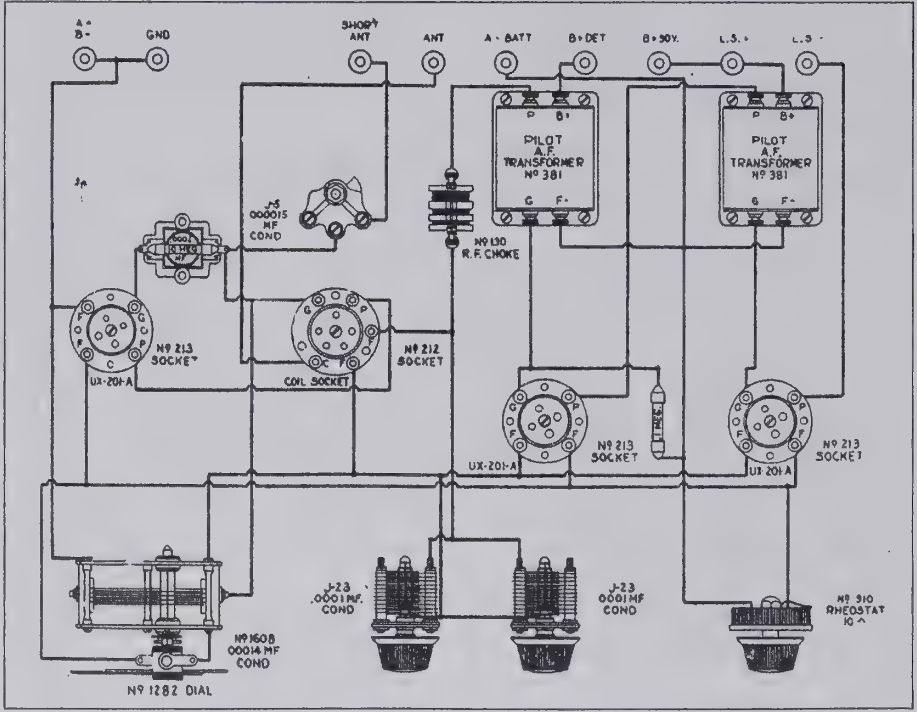
Both the coils and the receiver were designed by the Pilot Co. chief engineer John Geloso, an Italian born in Argentina. Robert S. Kruse, then the technical editor of *QST* magazine, assisted him in the design work, and in September, 1928 Geloso published the Wasp article in *Radio Design*.

A Pilot Wasp kit sold for $21.75, including all the parts and a set of five coils, but less the tubes and batteries. (*Note: The 1929 radio Catalog of the Barawick Co. of Chicago listed the kit for $19.70. A set of five coils could be purchased for $4.85—wf.*)

Geloso returned to Italy before World War II. After the war, he manufactured the Geloso amateur receiver and a companion amateur exciter.

The original 1928 Pilot panel and base were of Westinghouse Micarta. This material was not available to me, so in my replica Wasp I used Masonite taken from an old Philco TV console cabinet. It had a wood-grain finish similar to the that on the original.

The location of parts on the chassis and front panel was determined by scaling the dimensions from photographs in the Pilot brochure, using the



Pictorial diagram of the original Wasp.

2-17. POWER AMPLIFIER MODULE

The Power Amplifier Module consists of two printed circuit boards; a predriver board (assembly 2200) and a power amplifier board (assembly 2300). The module accepts low-level transmit signals from the HPF Module (Section 2-15) and amplifies them to the desired output level. Refer to figures 2-36 and 2-37 for schematic and figure 2-35 for parts list information.

Transmit signals for the HPF Module are applied to Q2201 via an impedance stabilizing pad consisting of R2204, R2205 and R2206. R2227 allows the gain of Q2201 to be adjusted, providing gain control for the PA Module. The output of Q2201 is matched by trifilar transformer T2201 to the base of Q2202. The output of Q2202 drives Q2203, the collector of which is connected to the output of the predriver board. U2201, a 5 VDC regulator, is biased by R2201 and R2202 to provide a regulated 8 VDC source for biasing Q2201, Q2202 and Q2203 for class A operaton to insure linearity. All B+ for the predriver board is obtained from the switched 13.6 VDC line, which is generated by the relay on the LPF Module (Section 2-14).

The output of the predriver board is connected to T2301 on the power amplifier board. C2301, L2301 and R2301 form a frequency compensation network to provide gain flatness across the operating range. T2301 matches the input of the power amplifier board to the bases of driver transistors Q2301 and Q2302. The driver stage operates in push-pull, and is matched to the power amplifier stage by T2303. B+is fed to the driver collectors through bifilar transformer T2302 to insure good balance. Q2303 and Q2304 form the push-pull power output stage. Each transistor is heavily swamped at the input and provided with low frequency inverse feedback to insure low frequency stability. The output of the power amplifier is matched to the 50 ohm input of the LPF Module by T2304.

Bias for the driver and power amplifier stages is derived from the switched 13.6 VDC line via 5 VDC regulator U2301. Driver bias is determined by the network consisting of Q2305, Q2306 and associated components. Both bias networks track the temperature of the power amplifier to prevent thermal runaway. B+ is present at all times on the collectors of the drivers and power amplifiers because the high currents involved are difficult to switch. No current is drawn in receive, however, because the bias for these stages is switched off.

Adjustment of the Power Amplifier Module is covered in Section 3. It is very important to note that the power amplifier board must be mounted on the heat sink for even the briefest periods of test or operation. Operation without the heat sink will result in damage to the power devices on this board.

NOTES:

known dimensions of the chassis (7" × 13") and the front panel (7" × 14"). The large vernier dial on the front panel controls tuning; the two knobs in the center are 100 pF regeneration capacitors; the knob on the right is the filament rheostat for the 201As and the dial lamp.

The coil socket is mounted behind the tuning capacitor. Note that the grid capacitor is mounted below the chassis, but the associated grid leak is mounted on clips above the chassis. The knob behind the coil socket is for the antenna coupling capacitor, used with a short antenna on the short wave bands.

Of interest is the fact that by using a resistance-coupled outboard amplifier, the Wasp could be used to receive early television signals, which were broadcast from station 3XK on 46.72 meters.

To power the receiver, I used a six-volt gel cell for the filaments, and a small AC power supply for the detector (45 volts d.c.) and amplifier stages (90 volts d.c.). Either high-impedance earphones or a magnetic speaker worked satisfactorily. A long-wire antenna for the BC band is connected to the ANT terminal. For short-wave reception, a short antenna is connected to the SHORT ANT terminal for direct coupling through the small antenna variable capacitor.

Using the BC coil, the upper capacitor is set at maximum capacity and the lower one is used to control regeneration. On all the other bands, the upper capacitor is set at minimum and, again, the lower one is used as the control. Adjustment of both the antenna capacitor at the rear of the chassis and the upper regeneration capacitor may be necessary to obtain regeneration over the entire tuning range of a coil.

This has been a fun receiver to play with, but it will never replace the National SW-3!

REFERENCES

"Short Wave Pilot Wasp Has World-Wide Range," by John Geleso. *Radio Design*, Vol. 1, No. 3, September 1928, p. 26.

Catalog, *Radio, Spring and Summer 1929*, The Barawik Co., Chicago, p. 152.

SUPPLEMENTAL

By William Fizette, W2DGB

In March 1993 I had the pleasure of visiting Dave McKenzie at his home in Eustis, FL, and in his collection was a very beautiful Wasp receiver, Type 3-SW, built from factory-supplied parts. The panel regeneration and filament controls were labeled, and in the upper right corner the set was identified as a "PILOT WASP, Pilot Electric Mfg. Co., Brooklyn, N.Y." The stained wood cabinet with a lift-up lid was nicely done, and the overall impression was of high quality. Unfortunately the estate was later sold at auction and the receiver disappeared into the hands of an unknown collector. Perhaps if he reads this, he will contact me so we will know what happened to it.

In reading through Paul's article, I was impressed by the well-known people who were associated with the Wasp designs. Besides John Geloso and Robert Kruse, Robert Hertzberg—who wrote for *Radio News*—should be mentioned. An excellent article by Hertzberg, "How to Get the Most Out of a Short-Wave Receiver," appeared in *Radio Design*, Vol. 2, No. 1. He used a Pilot Wasp as his example. Paul tells me that Bob Hertzberg, W2DJJ, was a friend of Bruce Kelley and an AWA member back in the 1970s.

Bruce Kelley reviewed the Wasp in the February, 1990 *Old Timers Bulletin*. He commented that these little sets are scarce, much more so than the later Pilot Super Wasp and the AC Super Wasp.

The production numbers had to have been low, and one reason could have been that the Super Wasp was introduced in early 1929 (reviewed by *Radio News* in June, 1929), just a few months after the Wasp's mid-1928 introduction. The AC Super Wasp came out just a few months later, in September, 1929 (reviewed by *Radio News* in January, 1930.) It was also obvious that the Wasp was in the "toy" category and required considerable skill to use, while the two Super Wasps were considered to be serious instruments.

Rider's Manuals published some scanty material on the Wasp in Volume 7. Since this was years after the receiver was sold, one can only speculate why the information was published at all.

A word on the coils. Paul mentioned to that he had borrowed the set from the Super Wasp detector circuit, and said they worked just fine in the little Wasp. A complication arises with the BC band coils; the Wasp requires an additional antenna winding, and the Super Wasp detector circuit does not use this. Paul used the Super Wasp coil connected to the short antenna terminal with good results.

THE VACUUM TUBE

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Finding Humor on eBay, Part 1

The Web auction site eBay is a great medium for exposing interesting tubes to (usually) eager buyers. Old-time tube collectors tend to be chagrined by a perceived rise in prices of tubes in an eBay world, particularly on those types that are useful for audio purposes. It's hard to regard the audiophiles too harshly. After all, they want to USE the tubes, and those tubes will still be around and collectible at the end of their lives. And there are occasional jaw-dropping bargains for alert bidders, like a WE 224C cathode-ray tube that sold lately for $37!

The postings themselves can be pretty wild, with "smart guys pretending to be dumb" and the less sophisticated trying to seem hip. There are various degrees of sly conduct and a lot of bad photography. (Was that tube shot against a blue background out of poor technique, or to hide a discolored bulb?) Things get really pressured when a tube can be represented, possibly with a little creativity, as a "Western Electric" product.

The author has been collecting samples of this flapdoodle for some years. Following are some of the strains of expression that could be exasperating but can just as well be treated as humor. Meanwhile, *Caveat e-Emptor*!

Naive Faith … Or a Simulation Thereof

Every seller wants to give the impression of offering good products. Sometimes a great degree of "reaching" can be seen.

"I received this tube from a retired repairman. I can't see why he would keep a bad tube."

"I have had this tube in my possession for over 40 years. I know it is good."

"Fred didn't keep 'em if they weren't good. "(Tube appears to have "gone to air.")

On a tube tester that has no means of calibration: "Powers up great, needs calibration."

A tube that: "Tests 70% of min.," "Needs to be aged."

Seller thinks tube's unused: "Because pins aren't scratched."

"All the filaments are intact; no burn marks."

"No emission stains."

"So beautyful and mythical."

"I was sold this tube with the assumption that it works."

"I'm sure it has to be good … I see no reason why it would not work fine" (tube sold as-is).

Just Plain Silly

"Inside mechanism looks very complex."

On a 2A3: "Has excellent tessitura, soundstaging, and dynamics. Its engraving [sic] is sharp, its pins look great, and its flashing is to die for."

On a FG-57 thyratron, "monster electron tube," "looks super cool."

On a WE tube socket: "tested for continuity which it passed with flying colors."

On a WE 300B: "I personally found the Bs to sound even more seductive than the As." (Evidently moving the locating pin 45° changes the sound!).

"I have a tube tester just haven't learned to use it."

"Tubes are a great investment."

"Great investment opportunity."

On a WE 239A: "Tests NOS at a whopping 650 micro ohms."

Snobbery and Guruism

On a KS-15720 tube tester: "I see no socket for the GE Compactron types (but who uses a nice tester like this for those?)."

On the (British) AVO 163 tube tester: "Many audiophiles and aficionados will attest to the supremacy of valve testers … All serious tube gurus from all over the world from U. S. to New Zealand will agree this is the valve tester to own."

On a Northern Electric R205D: "Has better internal construction than a WE 205D and sonically they have been characterized as being superior."

Setting eBay aside, here are a couple of serious items…

Jackson Model 648—Complete Tube Tester Manual, 2nd ed.

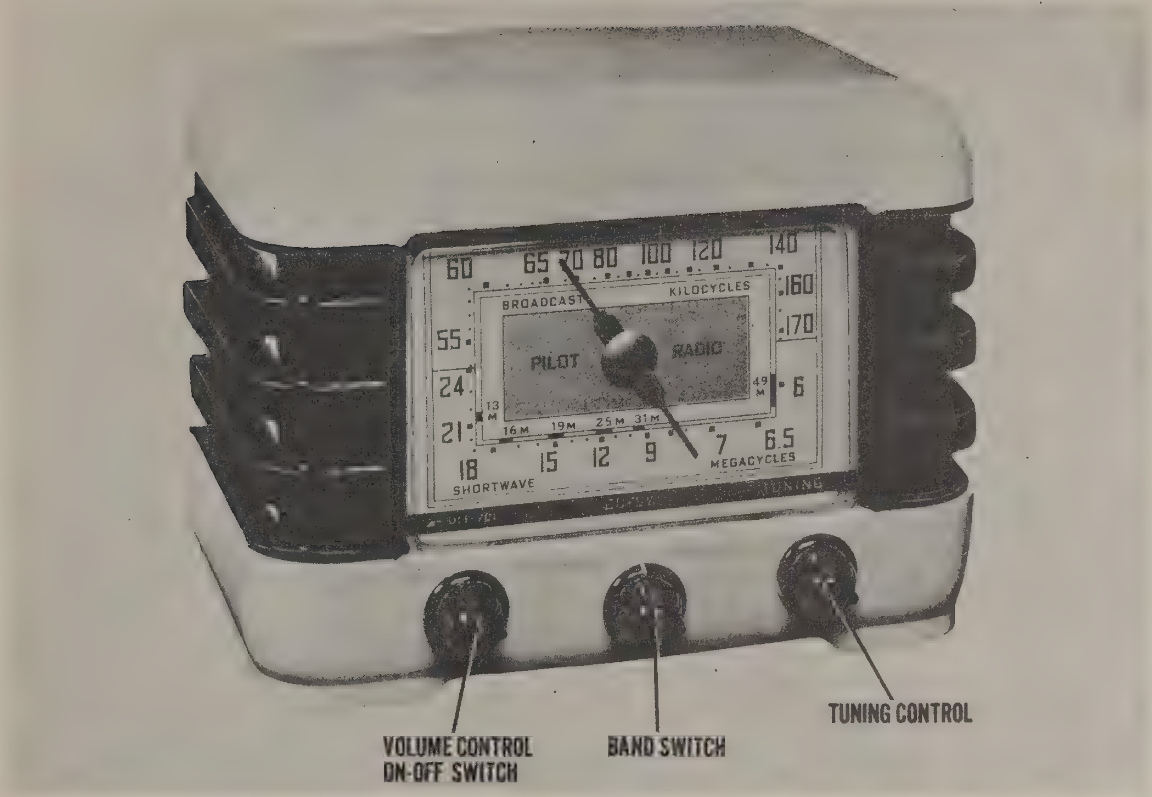
David Kraeuter reviewed this comprehensive book in the July 2004 issue. It provided the "full story" on this long-evolving family of high-quality testers. Now Jim Cross, its author, has produced a second edition, adding a variety of new features:

- A Jackson bulletin, "Modernization of 648 Testers," identifying models and ranges of serial numbers up to the 648-1.
- Instructions and schematics for the 648-1T.
- Clarified calibration instructions.
- Corrections for a few roll-chart settings, and some new ones.

(continued on page 25)

REF DES	DESCRIPTION	PART NO.
U9015	Integrated Circuit, 14017 CMOS	3041030
U9016	Integrated Circuit, 14081 CMOS	3041070
U9017	Integrated Circuit, 74LS390 TTL	3040478
U9018	Integrated Circuit, 14508 CMOS	3041100
U9019	Integrated Circuit, 14518 CMOS	3041115
U9020	Integrated Circuit, 14510 CMOS	3041105
U9021	Integrated Circuit, 14508 CMOS	3041100
U9022	Integrated Circuit, 14518 CMOS	3041115
U9023	Integrated Circuit, 14510 CMOS	3041105
U9024	Integrated Circuit, 14510 CMOS	3041105
U9025	Integrated Circuit, 14508 CMOS	3041100
U9026	Integrated Circuit, 14013 CMOS	3041020
U9027	Integrated Circuit, 14510 CMOS	3041105
U9028	Integrated Circuit, 74LS145 TTL	3040509
U9029	Integrated Circuit, 14558 CMOS	3041138
U9030	Integrated Circuit, 14013 CMOS	3041020
U9031	Integrated Circuit, 14013 CMOS	3041020
U9032	Integrated Circuit, ULN2003A	3040539
U9033	Integrated Circuit, Linear, 7805C	3040160
U9034	Integrated Circuit, Linear, 7805C	3040160
	2-Digit LED Display	3080021
	4-Digit LED Display	3080022
	25 Pin Connector	3290715

NOTES:



PILOT MODEL T-500U

TRADE NAME Pilot, Model T-500 Series
MANUFACTURER Pilot Radio Corp., 37-06 36th St. Long Island City N.Y.
TYPE SET AC-DC Operated Two Band Superheterodyne Receiver
TUBES (FIVE) Types 12SA7GT Converter, 12SK7GT IF Amp, 12SQ7GT Det.-AVC-AF
50L6GT Power Output, 35Z5GT Rectifier

POWER SUPPLY 105-120 Volts AC-DC
RATING .270 Amp. @ 117 Volts AC
TUNING RANGE—BROADCAST 535-1720KC
SHORT WAVE 5.6-24.0MC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set pointer turn variable fully closed and set pointer at the last reference mark at the low freq. end of the dial. Use isolation trans. if available. If not, connect capacitor in series with the low side of the signal generator and B-. Set volume control at maximum volume and output of signal generator no higher than is necessary to obtain output reading. Use insulated alignment screwdriver for adjusting.

DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
.1 MFD.	High side to stator of front section of variable. Low side to B-.	455KC	BC	Low freq. end	Across voice coil	A1, A2 A3, A4.	Adjust for maximum output If isolation trans. is not used reduce dummy ant to .001 MFD. to reduce hum modulation.
400Ω	High side to ext. ant. lead. Low side to B-.	18.0MC	SW	18.0MC	"	A5	Adjust for maximum output
400Ω	"	18.0MC	"	Tune for maximum output.	"	A6	Rock variable and adjust for maximum output.
200MMF.	"	1500KC	BC	1500KC	"	A7	Adjust for maximum output
200MMF.	"	600KC	"	Tune for maximum output.	"	A8	Rock variable and adjust for maximum output. Recheck A7 at 1500KC.

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PARTS LIST AND DESCRIPTIONS

TUBES

ITEM No.	USE	REPLACEMENT DATA		RMA BASE TYPE	INSTALLATION NOTES
		PILOT PART No.	STANDARD REPLACEMENT		
1	Converter	12SA7GT	12SA7GT	8AD	
2	IF Amp.	12SK7GT	12SK7GT	8N	
3	Det.-AVC-AF	12SQ7GT	12SQ7GT	8Q	
4	Power Output	50L6GT	50L6GT	7AC	
5	Rectifier	35Z5GT	35Z5GT	6AD	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						IDENTIFICATION CODES AND INSTALLATION NOTES
	CAP.	VOLT	PILOT PART No.	SOLAR PART No.	SPRAGUE PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	
6A	30	150	24-61	DY-303	EL-324	AF64D4A	UP4CJ2	FP313	■ Filter
B	20	150							▲ "
C	20	25							Cath. Bypass
7	.05	600	22-31	S-6-05	TC-15	684-05	DT6S5	TP415	Line Filter
8	.01	400	22-17	S-4-01	TC-11	484-01	DT4S1	TP421	Output Plate Bypass
9	.01	400	22-17	S-4-01	TC-11	484-01	DT4S1	TP421	Audio Coupling
10	.01	400	22-17	S-4-01	TC-11	484-01	DT4S1	TP421	" "
11	.05	200	22-16	S-4-05	TC-15	484-05	DT4S5	TP426	AVC Filter
12	.2	400	22-100	S-4-.2	TC-2	484-.2	DT4P2	TP429	Line Isolation
13	.1	400		S-4-1	TC-1	484-.1	DT4P1	TP428	RF Bypass Pwr. Supp.
14	.01	400	22-17	S-4-01	TC-11	484-01	DT4S1	TP421	Fixed Padder SW
15	100	500	20-14	M0.5-31	1FM-31	1468-0001	5W5T1	MC235	Tone Compensation
16	35	500	20-90	M0.5-43	MS-43		5W5Q3		AVC Coupling
17	500	500	20-30	M0.5-35	1FM-35	1468-0005	5W5T5	MC245	IF Bypass Vol. Cont.
18	100	500	20-14	M0.5-31	1FM-31	1468-0001	5W5T1	MC235	Osc. Grid Capacitor
19	10	500	20-2	M0.5-41	1FM-41	1468-00001	5W5Q1	MC215	Ant. Coupling
20	520	500							Fixed Trimmer *

*Not used in all models.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA				INSTALLATION NOTES
	RESISTANCE	WATTS	PILOT PART No.	MALLORY PART No.	IRC PART No.	CLAROSTAT PART No.	
21A	500KΩ	1	36-24	MR48	D13-133	M-60-Z	Volume Control
B	Shaft		Not Req.	Not Req.	A	Not Req.	Attach to 21A per instructions.
C	Switch		" "	M26	41	SW-A	" " " " "

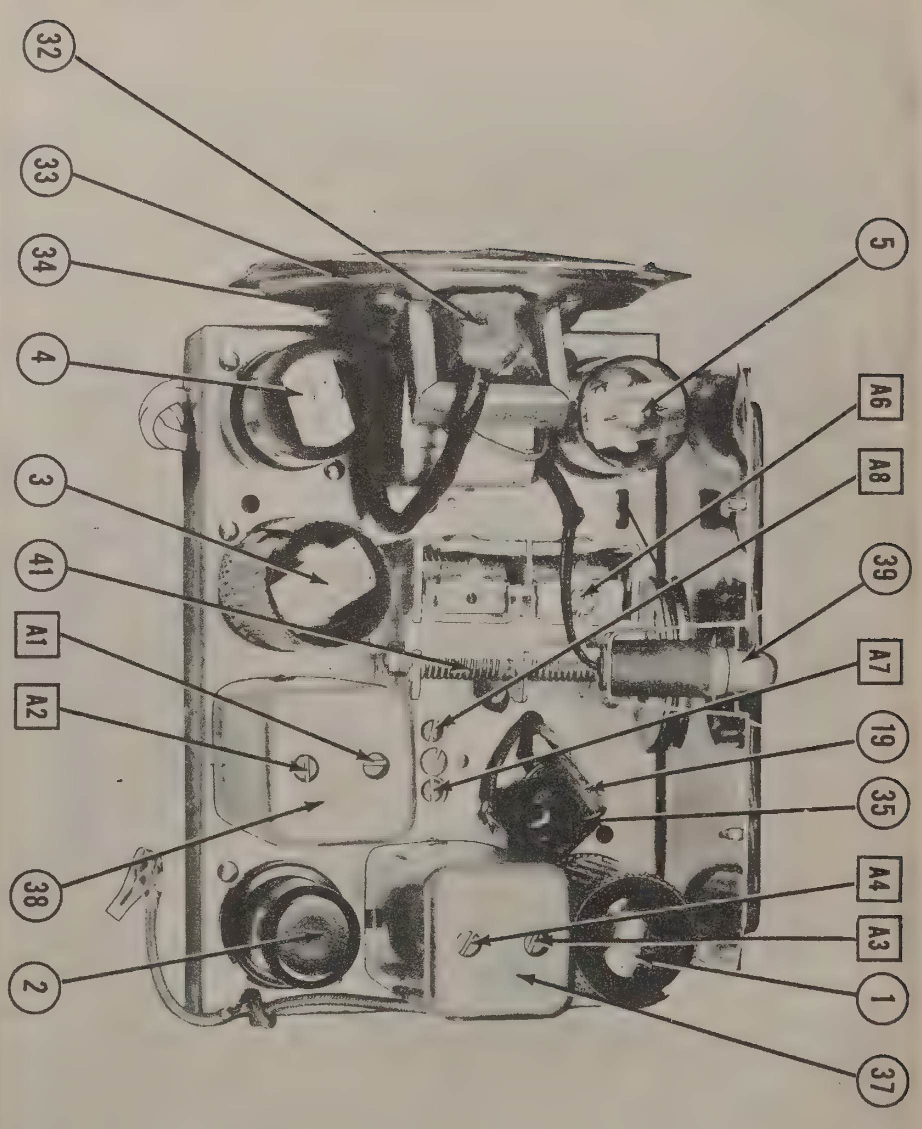
RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	PILOT PART No.	IRC PART No.	
22	20Ω	½	30-8	BW-½-22	Red-Blk.-Blk. Parasitic Suppressor
23	22KΩ	½	30-266	BTS 22K	Red-Red-Or. Oscillator Grid
24	220KΩ	½	30-271	BTS-220K	Red-Red-Yl. Line Isolation
25	2.2 Meg.	½	30-278	BTS-2.2 Meg	Red-Red-Grn. AVC Network
26	2.2 Meg.	½	30-278	BTS-2.2 Meg	Red-Red-Grn. " Load
27	3.9 Meg.	½	30-375	BTS-3.9 Meg	Or.-White-Grn. AF Grid
28	330KΩ	½	30-295	BTS-330K	Or.-Or.-Yl. " Plate Load
29	470KΩ	½	30-274	BTS-470K	Yl.-Vi.-Yl. Output Grid
30	120Ω	½	30-394	BW-½-120	Br.-Red-Br. " Cathode
31	150Ω	½	30-363	BW-½-150	Br.-Grn.-Br. Pilot Light Shunt

TRANSFORMER (OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		PILOT PART No.	STANCOR PART No.	THORDAR'N PART No.		
	PRI.	SEC.	PRI.	SEC.					
32	1700Ω	2.9Ω	185Ω	.5Ω	Part of 40-19	A-3876+	T22S45+		+ Drill one new mounting hole

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA PILOT PART No.	REPLACEMENT DATA JENSEN PART No.		INSTALLATION NOTES
33	FIELD RES. 450Ω	VC IMP. 2.9Ω	40-19	ST-537 Mod. H4-S		
34	CONE DIA. 4"	VC DIA. ½"	NOT READILY	REPLACEABLE-USE COMPLETE SPEAKER UNIT.		

R F COILS

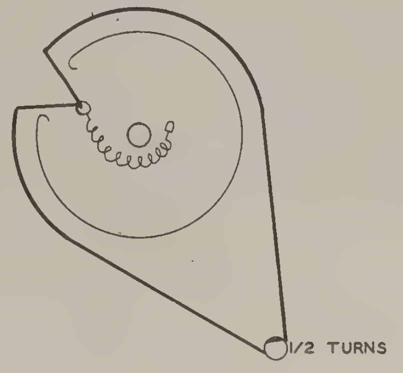
ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA PILOT PART No.	REPLACEMENT DATA MEISSNER PART No.	INSTALLATION NOTES
35A	BC Ant. Coil		4Ω	70-51		35A & 35B wound on same form
35B	SW Ant. Coil		.2Ω			
36A	BC Osc. Coil		2.1Ω	72-44		36A & 36B wound on same form.
36B	SW Osc. Coil		.1Ω			
37	Input IF	8Ω	8.3Ω	273-91	16-6658	
38	Output IF	8.5Ω	8Ω	273-93	16-6660	

DIAL LIGHT

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA PILOT PART No.		INSTALLATION NOTES
39	Bayonet	6-8	0.15	Brown	68-6		Type 47

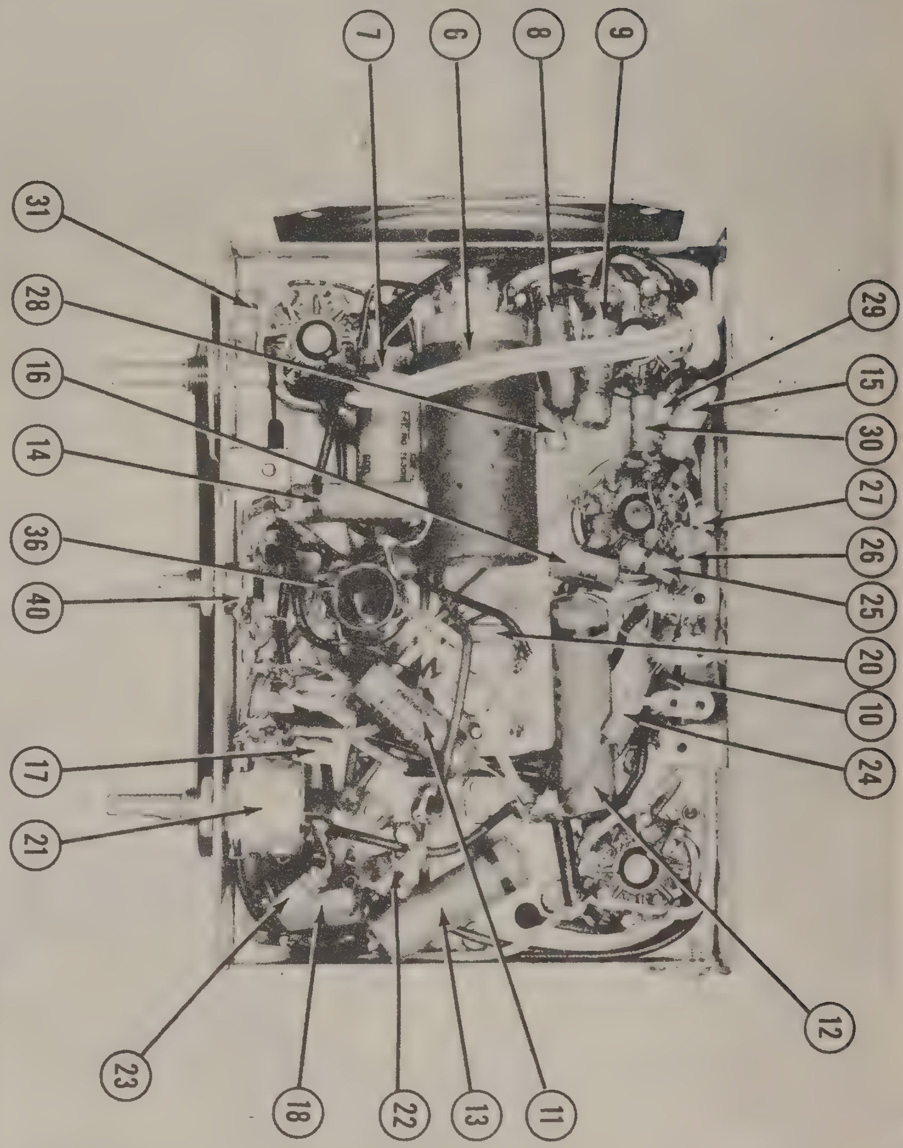
MISCELLANEOUS

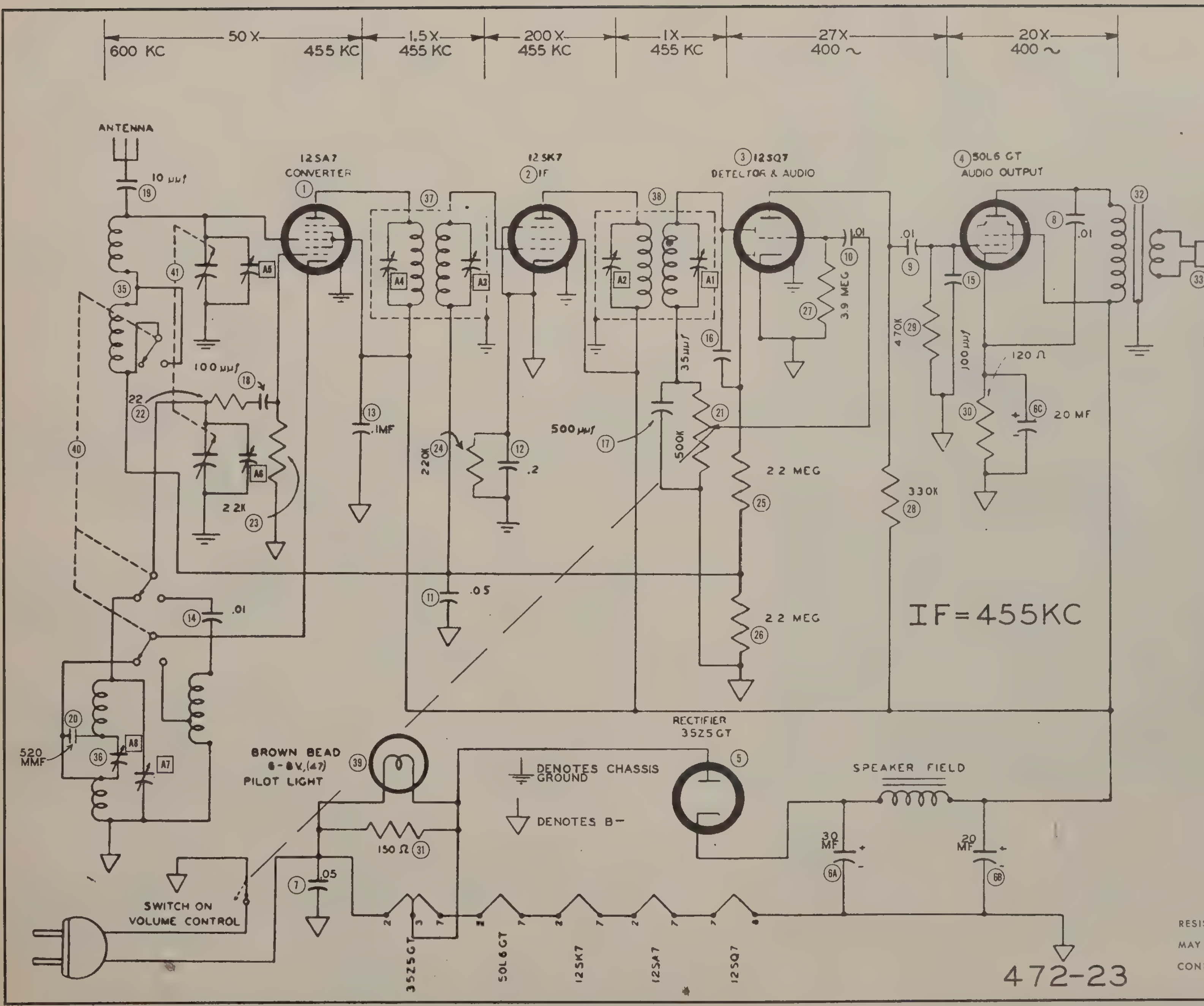
ITEM No.	PART NAME	PILOT PART No.	NOTES
40	Bandswitch	100-49	
41	2-Gang Var. Cap	26-28	(14-548 MMF, 14-548 MMF)
A7	Dual Trimmer	27-18	BC Osc. Adjustment
A8			BC Osc. Padder



DIAL CORD DRIVE

CHASSIS—BOTTOM VIEW





Pin	12SA7GT		12SK7	
No.	Volt.	Res	Volt	Res
1	0V.	220KΩ	0V.	220KΩ
2	24V.AC	23Ω	24V.AC	23Ω
3	91V.DC	60KΩ	0V.	0Ω
4	91V.DC	60KΩ	-.7V.DC	2 MEG.
5	-.2V.DC	20KΩ	0V.	0Ω
6	0V.	.5Ω	91V.DC	60KΩ
7	12V.AC	12Ω	36V.AC	34Ω
8	-3.5V.DC	2 MEG.	91V.DC	60KΩ

Pin	12SQ7GT		50L6GT	
No	Volt	Res	Volt	Res
1	0V.	220KΩ	0V.	INF.
2	-.7V.DC	3.5MEG.	87V.AC	76Ω
3	0V.	0Ω	83V.DC	60KΩ
4	-.3V.DC	4 MEG.	91V.DC	60KΩ
5	-.3V.DC	420KΩ	0V.	450KΩ
6	56V.DC	390KΩ	0V.	INF.
7	12V.AC	12Ω	36V.AC	34Ω
8	0V.	0Ω	5.4V.DC	110Ω

Pin	35Z5GT	
No	Volt	Res
1	0V.	0Ω
2	117V.AC	100Ω
3	113V.AC	99Ω
4	0V.	INF.
5	113V.AC	99Ω
6	0V.	INF.
7	87V.AC	76Ω
8	122V.DC	60KΩ

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative and 3-volt battery bias substituted for measurement.

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

PILOT MODEL T-531AB

TRADE NAME Pilot, Model T-530 Series
MANUFACTURER Pilot Radio Corp., 37-06 36th St., Long Island City, N.Y.
TYPE SET AC-DC Operated Multiband Superheterodyne Receiver
TUBES (EIGHT) Types, 6SB7Y Converter, 6SG7 IF Amp., 6SG7 2nd IF Amp., 6SJ7 Limiter, 6H6 Discriminator, 6SJ7 1st AF Amp., 25L6GT Power Output, 25Z6GT Rectifier.
POWER SUPPLY 100-125 Volts AC-DC or 220 Volts AC-DC (with ballast)
RATING .520 Amp. @ 117 Volts AC SHORT WAVE 5.6-18.5MC, 9.353-9.795 MC, 11.241-12.419MC
TUNING RANGE—BROADCAST 535-1720KC FM 87.5-108.5 MC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set pointer, turn variable fully closed and set pointer at the last reference mark at the left end of the dial. Use isolation transformer if available. If not, connect capacitor in series with the low side of the signal generator and B–. Set volume control at maximum volume and keep output of signal generator no higher than is necessary to obtain output reading. For FM alignment use a 0-200 DC microammeter in series with a 100,000 ohms resistor or a 0-20 volt DC vacuum tube voltmeter and for discriminator alignment use a 50-0-50 microammeter in series with a 100,000 ohm resistor as an output indicator. Use insulated alignment screwdriver for adjusting.

DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
.1 MFD.	High side to pin #8 of 6SB7. Low side to B–.	455KC	BC	Low freq. end.	Across voice coil	A1,A2, A3	Adjust for maximum output If isolation trans. is not used reduce dummy ant. to .001 MFD to reduce hum modulation.
.1 MFD.	"	10.7MC	FM	"	Microammeter between AVC line and B–.	A4,A5, A6,A7, A8,A9.	Short limiter screen grid (pin #6) to B–. Adjust for maximum reading then remove short.
.1 MFD.	"	"	"	"	Microammeter to junction of the two 330K resistors on disc. trans. and B–.	A10	Adjust for maximum reading.
.1 MFD.	"	"	"	"	Zero center scale microammeter to pin #6 of 6H6 and B–.	A11	Adjust for zero reading. Swing signal generator to 10.6 and 10.8 MC and record both readings. If these readings are not equal repeat last two steps and check again. It may be necessary to readjust A10 slightly to get these readings equal.
	No connection. (Signal generator off)		International SW	Tune near 10.7MC for maximum meter reading.	Microammeter to AVC line and B–.	A12	Adjust for minimum reading
200 MMF	High side to ant. post A. Low side to chassis.	1500KC	BC	150	Across voice coil	A13,A14	Adjust for maximum output in order given.
200 MMF	"	600KC	"	Tune for maximum output.	"	A15	Rock variable and adjust for maximum output. Repeat last two steps until no further improvement can be made.
400 ohms	"	18.0MC	International SW	18MC	"	A16,A17	Adjust for maximum output in order given.
400 ohms	"	9.5MC	31 Meter Band	9.5MC	"	A18,A19	"
400 ohms	"	12.0MC	25 Meter Band	12MC	"	A20,A21	"
300 ohms	"	98MC	FM	98MC	"	A22,A23	"
200 MMF	"	455KC	BC	Low freq.end	"	A24	Adjust for minimum output

HOWARD W. SAMS & CO., INC. • 2924 East Washington Street • Indianapolis 6, Indiana

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PARTS LIST AND DESCRIPTIONS

TUBES

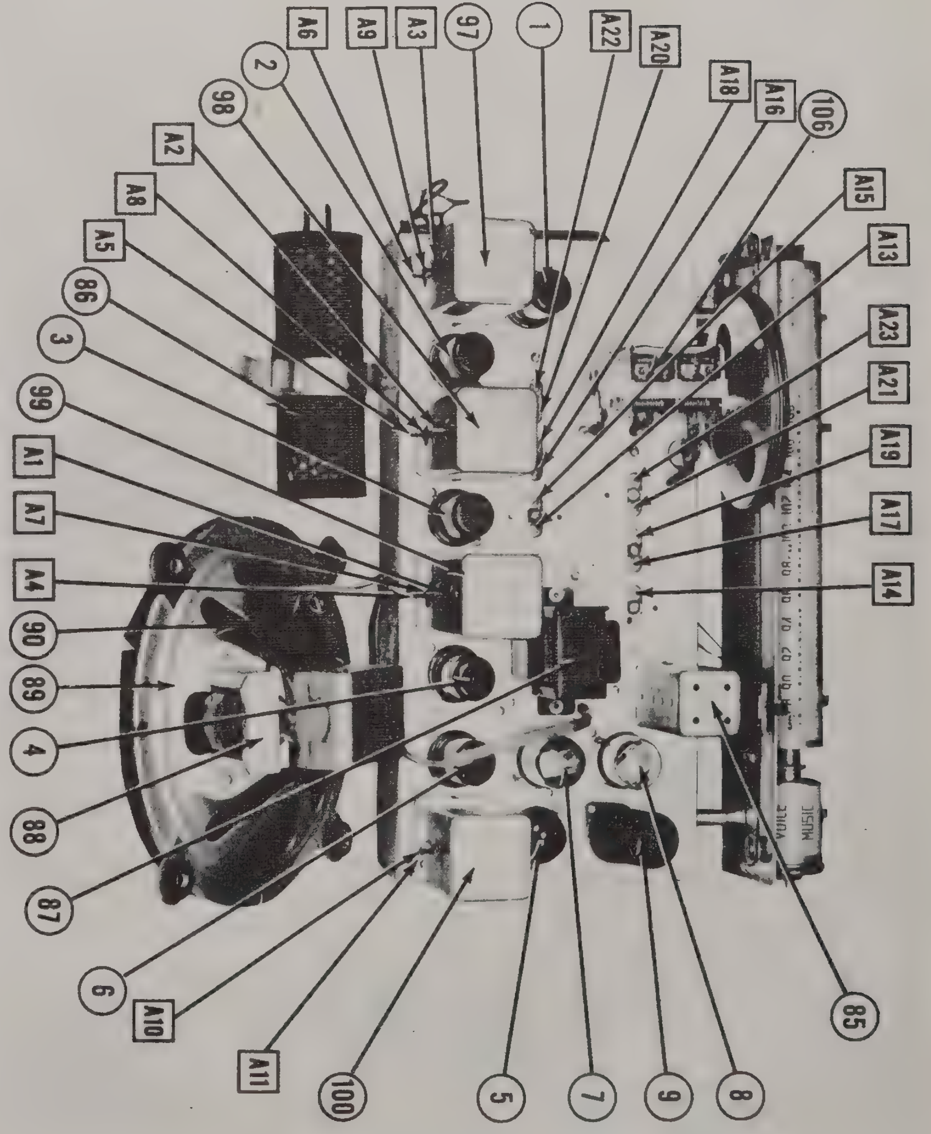
ITEM No.	USE	REPLACEMENT DATA PILOT PART No.	REPLACEMENT DATA STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	Converter	6SB7Y	6SB7Y	8R	
2	IF Amp.	6SG7	6SG7	8BK	
3	2nd IF Amp.	6SG7	6SG7	8BK	
4	Limiter	6SJ7	6SJ7	8N	
5	Discriminator	6H6	6H6	7Q	
6	1st AF	6SJ7	6SJ7	8N	
7	Pwr. Output	25L6GT	25L6GT	7AC	
8	Rectifier	25Z6GT	25Z6GT	7Q	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA PILOT PART No.	SOLAR PART No.	SPRAGUE PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
9A	50	150	24-37	M-40-150	EL-51	AF1010D†	BR5015		▲ Filter
B	120	150		DY-8040-150	EL-123	PRS150-50†	UP6CJ44†		■ "
10	25	25	24-64	M-25-25	TA-25	PRS25-25	BR252A	TC26	Output Cath. Bypass
11	25	25	24-64	M-25-25	TA-25	PRS25-25	BR252A	TC26	Audio Cath. Bypass
12	.1	600	22-37	S-6-1	TC-1	684-.1	DT6P1	TP418	Line Bypass
13	.01	400	22-17	S-4-01	TC-11	484-01	DT4S1	TP421	Filament Bypass
14	.01	400	22-17	S-4-01	TC-11	484-01	DT4S1	TP421	" "
15	.005	600	22-11	S-6-005	TC-25	684-005	DT6D5	TP408	Output Plate Bypass
16	.01	600	22-18	S-6-01	TC-11	684-01	DT6S1	TP410	Audio Coupling
17	.05	200	22-28	S-4-05	TC-15	484-05	DT6S5	TP426	Audio Screen Bypass
18	.01	400	22-17	S-4-01	TC-11	484-01	DT6S1	TP421	Line Isolation
19	.01	600	22-50	S-6-01	TC-11	684-01	DT6S1	TP410	Audio Coupling #
20	.01	400	22-17	S-4-01	TC-11	484-01	DT4S1	TP421	Line Isolation
21	.003	600	22-62	S-6-003	TC-23	684-003	DT6D3	TP406	Tone Compensation
22	.01	400	22-17	S-4-01	TC-11	484-01	DT4S1	TP421	Audio Coupling
23	.01	400	22-17	S-4-01	TC-11	484-01	DT4S1	TP421	Lim. Plate Decoupling
24	.01	400	22-17	S-4-01	TC-11	484-01	DT4S1	TP421	Lim. Screen Bypass
25	.01	400	22-17	S-4-01	TC-11	484-01	DT4S1	TP421	2nd IF Screen Bypass
26	.05	400	22-30	S-4-05	TC-15	484-05	DT4S5	TP426	2nd IF Screen Bypass
27	.01	400	22-17	S-4-01	TC-11	484-01	DT4S1	TP421	2nd IF Cath. Bypass
28	.05	400	22-30	S-4-05	TC-15	484-05	DT4S5	TP426	AVC Filter
29	.01	400	22-17	S-4-01	TC-11	484-01	DT4S1	TP421	RF Bypass Pwr. Supp.
30	.01	400	22-17	S-4-01	TC-11	484-01	DT4S1	TP421	1st IF Screen Bypass
31	.01	400	22-17	S-4-01	TC-11	484-01	DT4S1	TP421	1st IF Cath. Bypass
32	.05	400	22-30	S-4-05	TC-15	484-05	DT4S5	TP426	Line Isolation
33	.01	400	22-17	S-4-01	TC-11	484-01	DT4S1	TP421	" "
34	.05	400	22-30	S-4-05	TC-15	484-05	DT4S5	TP426	Conv. Cath. Bypass SW
35	.01	400	22-17	S-4-01	TC-11	484-01	DT4S1	TP421	Conv. Plate Decoupling
36	.01	400	22-17	S-4-01	TC-11	484-01	DT4S1	TP421	Conv. Screen Bypass
37	.01	600	22-50	S-6-01	TC-11	684-01	DT6S1	TP410	Line Isolation
38	.01	400	22-17	S-4-01	TC-11	484-01	DT4S1	TP421	AVC Filter
39	5000	500	20-115	MW.5-25	1FM-25	1467-005	1D5D5	MC465	Filament Bypass
40	100	500	20-14	M0.5-31	1FM-31	1468-0001	5W5T1	MC235	" "
41	100	500	20-14	M0.5-31	1FM-31	1468-0001	5W5T1	MC235	" "
42	100	500	20-14	M0.5-31	1FM-31	1468-0001	5W5T1	MC235	" "
43	100	500	20-14	M0.5-31	1FM-31	1468-0001	5W5T1	MC235	Tone Compensation
44	100	500	20-14	M0.5-31	1FM-31	1468-0001	5W5T1	MC235	" "
45	100	500	20-14	M0.5-31	1FM-31	1468-0001	5W5T1	MC235	" "
46	100	500	20-14	M0.5-31	1FM-31	1468-0001	5W5T1	MC235	IF Bypass Disc.
47	400	500	20-121	M0.5-34	1FM-34	1468-0004	5W5T4	MC243	IF Bypass Vol. Cont.
48	100	500	20-14	M0.5-31	1FM-31	1468-0001	5W5T1	MC235	2nd IF Screen Bypass
49	150	500	20-120	M0.5-315	1FM-315	1468-00015	5W5T15	MC236	1st IF Screen Bypass
50	5000	500	20-115	MW.5-25	1FM-25	1467-0005	5W5T5	MC465	Line Isolation
51	3600	500	21-35						Fixed Padder SW
52	250	500	20-22	M0.5-325	1FM-325	1468-00025	5W5T25	MC240	Conv. Screen Bypass
53	100	500	20-14	M0.5-31	1FM-31	1468-0001	5W5T1	MC235	Osc. Grid Capacitor
54	350	500	20-137						Fixed Padder BC
55	10	500	21-36	MOS.5-41	MS-41	1469-00001	5R5Q1	MCB215	Ant. Coupling
56	35	500	20-9						Fixed Trimmer BC
57	500	500	20-30	M0.5-35	1FM-35	1468-0005	5W5T5	MC245	FM Ant.
58	100	500	20-14	M0.5-31	1FM-31	1468-0001	5W5T1	MC235	RF Coupling

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						IDENTIFICATION CODES AND INSTALLATION NOTES
	CAP.	VOLT	PILOT PART No.	SOLAR PART No.	SPRAGUE PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	
107	100	500	20-14	M0.5-31	1FM-31	1468-0001	5W5T1	MC235	Tone Compensation
108	500	500	20-30	M0.5-35	1FM-35	1468-0005	5W5T5	MC245	Line Isolation ‡

Replacement must have shield.
† Parallel sections to obtain desired capacity.
‡ Not used in all models.

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	6SB7Y	0V.	25 V.AC	122 V.DC	105 V.DC	-3.5 V.DC	0V.	19 V.AC	-.2 V.DC
2	6SG7	0V.	31 V.AC	1 V.DC	-.1 V.DC	1 V.DC	103 V.DC	25 V.AC	103 V.DC
3	6SG7	0V.	36 V.AC	1 V.DC	-.1 V.DC	1 V.DC	103 V.DC	31 V.AC	103 V.DC
4	6SJ7	0V.	12 V.AC	0V.	-.6 V.DC	0V.	0V.	19 V.DC	122 V.DC
5	6H6	0V.	6 V.AC	-.6 V.DC	0V.	-.6 V.DC	0V.	0V.	0V.
6	6SJ7	0V.	12 V.AC	0V.	0V.	1.2 V.DC	18 V.DC	6 V.AC	32 V.DC
7	25L6GT	0V.	52 V.AC	113 V.DC	123 V.DC	0V.	0V.	36 V.AC	8.4 V.DC
8	25Z6GT	0V.	77 V.AC	117 V.AC	132 V.DC	117 V.DC	0V.	52 V.AC	132 V.DC

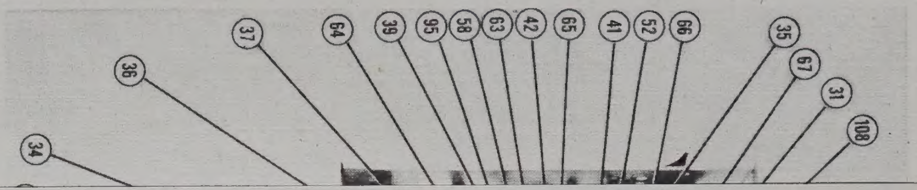
RESISTANCE READINGS

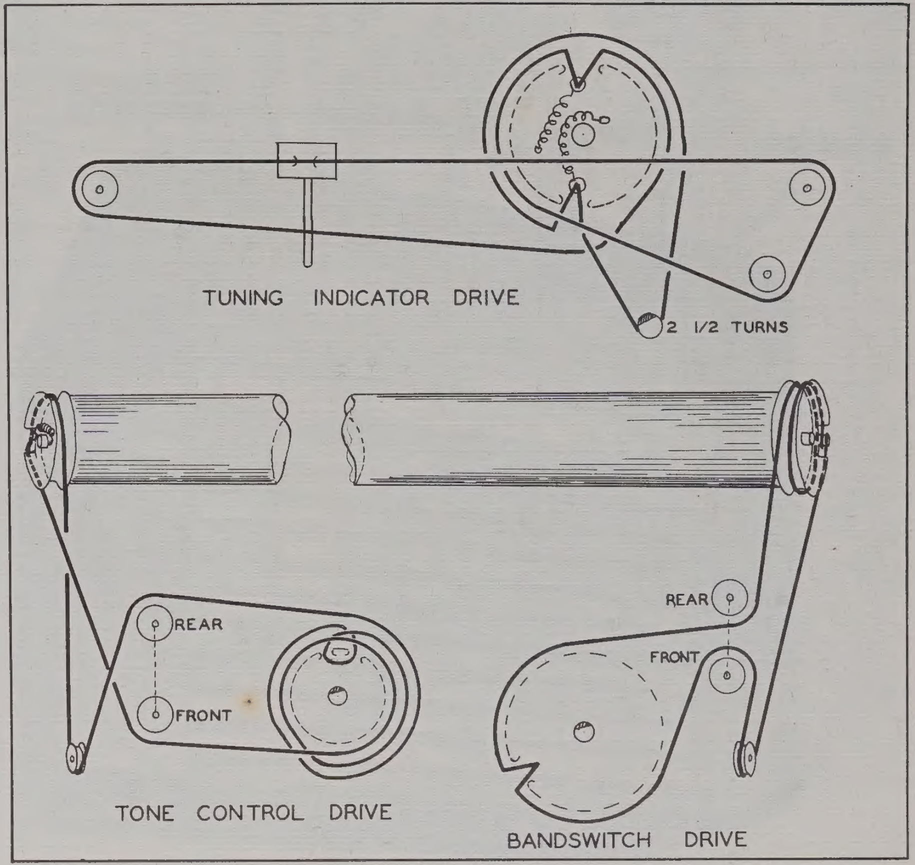
Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	6SB7Y	67KΩ	16Ω	45KΩ	45KΩ	93KΩ	1Ω	12Ω	2 MEG.
2	6SG7	67KΩ	18Ω	140Ω	1.8 MEG.	140Ω	45KΩ	16Ω	45KΩ
3	6SG7	67KΩ	21Ω	140Ω	1.8 MEG.	140Ω	45KΩ	18Ω	45KΩ
4	6SJ7	67KΩ	8Ω	0Ω	560KΩ	0Ω	0Ω	12Ω	92KΩ
5	6H6	67KΩ	4Ω	160KΩ	40KΩ	160KΩ	0Ω	0Ω	0Ω
6	6SJ7	67KΩ	8Ω	0Ω	4 MEG.	22KΩ	1 MEG.	4Ω	265KΩ
7	25L6GT	67KΩ	34Ω	45KΩ	45KΩ	460KΩ	10Ω	21Ω	140Ω
8	25Z6GT	INF.	44Ω	78Ω	45KΩ	78Ω	0Ω	34Ω	45KΩ

§RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

1 - DC Voltage measurements are at 20,000 ohms per volt,
    AC Voltages measured at 1000 ohms per volt.
2 - Socket connections are shown as bottom views.
3 - Measured values are from socket pin to common negative.
4 - Line voltage maintained at 117 volts for voltage readings.
5 - Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6 - Volume control at maximum, no signal applied for voltage measurements.

CHASSIS—BOTTOM VIEW





PARTS LIST AND DESCRIPTIONS

TUBES

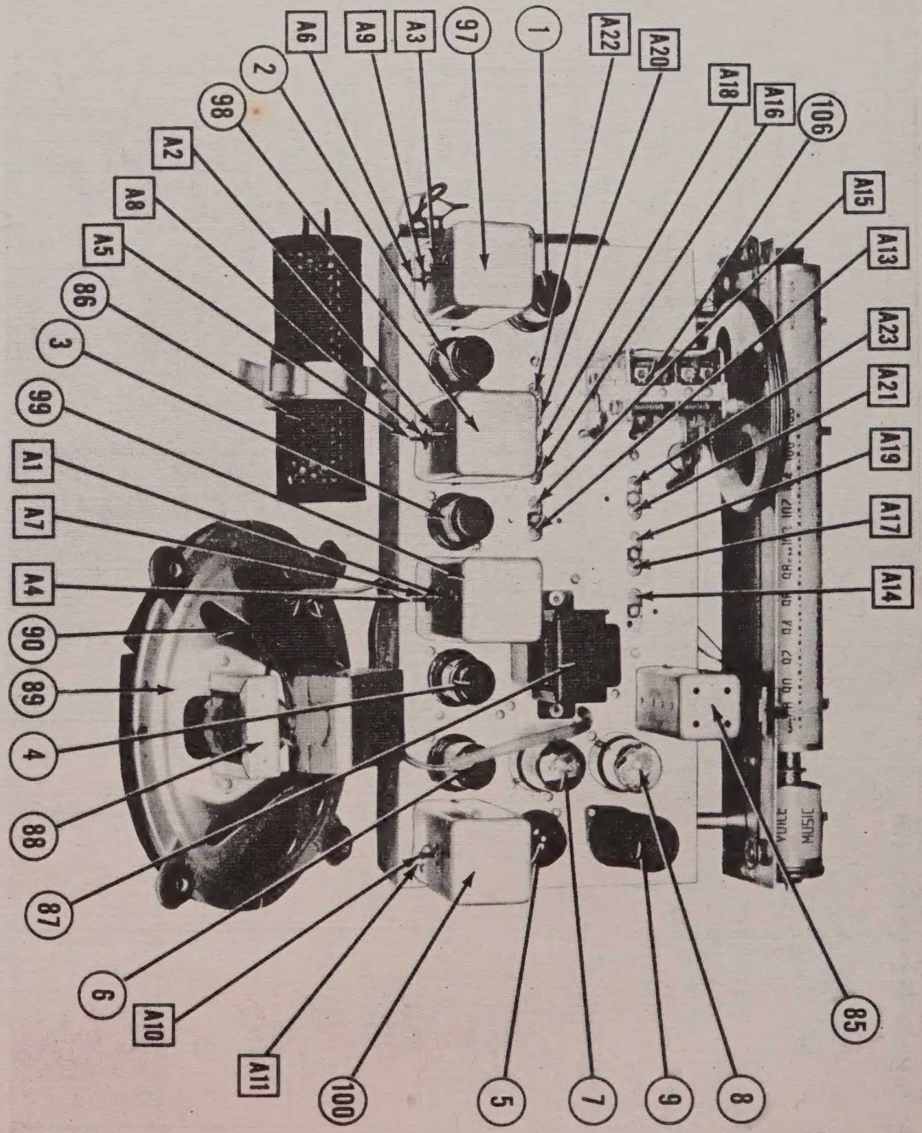
ITEM No.	USE	REPLACEMENT DATA		RMA BASE TYPE	INSTALLATION NOTES
		PILOT PART No.	STANDARD REPLACEMENT		
1	Converter	6SB7Y	6SB7Y	8R	
2	IF Amp.	6SG7	6SG7	8BK	
3	2nd IF Amp.	6SG7	6SG7	8BK	
4	Limiter	6SJ7	6SJ7	8N	
5	Discriminator	6H6	6H6	7Q	
6	1st AF	6SJ7	6SJ7	8N	
7	Pwr. Output	25L6GT	25L6GT	7AC	
8	Rectifier	25Z6GT	25Z6GT	7Q	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						IDENTIFICATION CODES AND INSTALLATION NOTES
	CAP.	VOLT	PILOT PART No.	SOLAR PART No.	SPRAGUE PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	
9A	50	150	24-37	M-40-150	EL-51	AF1010D†	BR5015		▲ Filter
B	120	150		DY-8040-150	EL-123	PRS150-50†	UP6CJ44†		■ "
10	25	25	24-64	M-25-25	TA-25	PRS25-25	BR252A	TC26	Output Cath. Bypass
11	25	25	24-64	M-25-25	TA-25	PRS25-25	BR252A	TC26	Audio Cath. Bypass
12	.1	600	22-37	S-6-1	TC-1	684-.1	DT6P1	TP418	Line Bypass
13	.01	400	22-17	S-4-01	TC-11	484-01	DT4S1	TP421	Filament Bypass
14	.01	400	22-17	S-4-01	TC-11	484-01	DT4S1	TP421	" "
15	.005	600	22-11	S-6-005	TC-25	684-005	DT6D5	TP408	Output Plate Bypass
16	.01	600	22-18	S-6-01	TC-11	684-01	DT6S1	TP410	Audio Coupling
17	.05	200	22-28	S-4-05	TC-15	484-05	DT6S5	TP426	Audio Screen Bypass
18	.01	400	22-17	S-4-01	TC-11	484-01	DT6S1	TP421	Line Isolation
19	.01	600	22-50	S-6-01	TC-11	684-01	DT6S1	TP410	Audio Coupling #
20	.01	400	22-17	S-4-01	TC-11	484-01	DT4S1	TP421	Line Isolation
21	.003	600	22-62	S-6-003	TC-23	684-003	DT6D3	TP406	Tone Compensation
22	.01	400	22-17	S-4-01	TC-11	484-01	DT4S1	TP421	Audio Coupling
23	.01	400	22-17	S-4-01	TC-11	484-01	DT4S1	TP421	Lim. Plate Decoupling
24	.01	400	22-17	S-4-01	TC-11	484-01	DT4S1	TP421	Lim. Screen Bypass
25	.01	400	22-17	S-4-01	TC-11	484-01	DT4S1	TP421	2nd IF Screen Bypass
26	.05	400	22-30	S-4-05	TC-15	484-05	DT4S5	TP426	2nd IF Screen Bypass
27	.01	400	22-17	S-4-01	TC-11	484-01	DT4S1	TP421	2nd IF Cath. Bypass
28	.05	400	22-30	S-4-05	TC-15	484-05	DT4S5	TP426	AVC Filter
29	.01	400	22-17	S-4-01	TC-11	484-01	DT4S1	TP421	RF Bypass Pwr. Supp.
30	.01	400	22-17	S-4-01	TC-11	484-01	DT4S1	TP421	1st IF Screen Bypass
31	.01	400	22-17	S-4-01	TC-11	484-01	DT4S1	TP421	1st IF Cath. Bypass
32	.05	400	22-30	S-4-05	TC-15	484-05	DT4S5	TP426	Line Isolation
33	.01	400	22-17	S-4-01	TC-11	484-01	DT4S1	TP421	" "
34	.05	400	22-30	S-4-05	TC-15	484-05	DT4S5	TP426	Conv. Cath. Bypass SW
35	.01	400	22-17	S-4-01	TC-11	484-01	DT4S1	TP421	Conv. Plate Decoupling
36	.01	400	22-17	S-4-01	TC-11	484-01	DT4S1	TP421	Conv. Screen Bypass
37	.01	600	22-50	S-6-01	TC-11	684-01	DT6S1	TP410	Line Isolation
38	.01	400	22-17	S-4-01	TC-11	484-01	DT4S1	TP421	AVC Filter
39	5000	500	20-115	MW.5-25	1FM-25	1467-005	1D5D5	MC465	Filament Bypass
40	100	500	20-14	M0.5-31	1FM-31	1468-0001	5W5T1	MC235	" "
41	100	500	20-14	M0.5-31	1FM-31	1468-0001	5W5T1	MC235	" "
42	100	500	20-14	M0.5-31	1FM-31	1468-0001	5W5T1	MC235	" "
43	100	500	20-14	M0.5-31	1FM-31	1468-0001	5W5T1	MC235	Tone Compensation
44	100	500	20-14	M0.5-31	1FM-31	1468-0001	5W5T1	MC235	" "
45	100	500	20-14	M0.5-31	1FM-31	1468-0001	5W5T1	MC235	" "
46	100	500	20-14	M0.5-31	1FM-31	1468-0001	5W5T1	MC235	IF Bypass Disc.
47	400	500	20-121	M0.5-34	1FM-34	1468-0004	5W5T4	MC243	IF Bypass Vol. Cont.
48	100	500	20-14	M0.5-31	1FM-31	1468-0001	5W5T1	MC235	2nd IF Screen Bypass
49	150	500	20-120	M0.5-315	1FM-315	1468-00015	5W5T15	MC236	1st IF Screen Bypass
50	5000	500	20-115	MW.5-25	1FM-25	1467-0005	5W5T5	MC465	Line Isolation
51	3600	500	21-35						Fixed Padder SW
52	250	500	20-22	M0.5-325	1FM-325	1468-00025	5W5T25	MC240	Conv. Screen Bypass
53	100	500	20-14	M0.5-31	1FM-31	1468-0001	5W5T1	MC235	Osc. Grid Capacitor
54	350	500	20-137						Fixed Padder BC
55	10	500	21-36	M0S.5-41	MS-41	1469-00001	5R5Q1	MCB215	Ant. Coupling
56	35	500	20-9						Fixed Trimmer BC
57	500	500	20-30	M0.5-35	1FM-35	1468-0005	5W5T5	MC245	FM Ant.
58	100	500	20-14	M0.5-31	1FM-31	1468-0001	5W5T1	MC235	RF Coupling

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS

TUBES

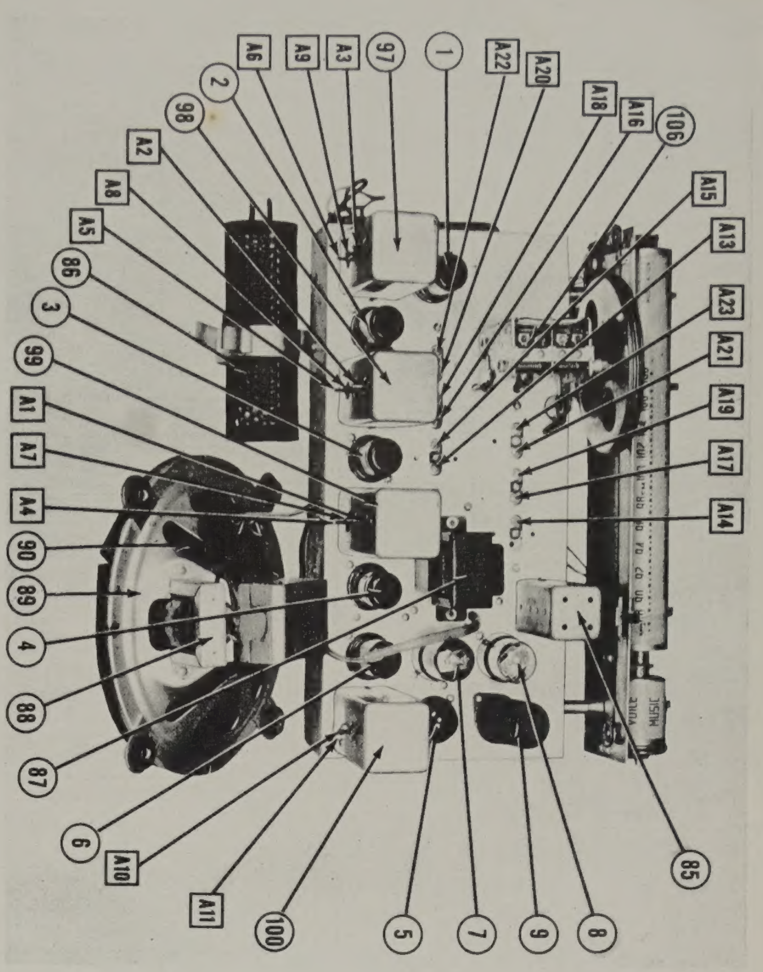
ITEM No.	USE	REPLACEMENT DATA PILOT PART No.	STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	Converter	6SB7Y	6SB7Y	8R	
2	IF Amp.	6SG7	6SG7	8BK	
3	2nd IF Amp.	6SG7	6SG7	8BK	
4	Limiter	6SJ7	6SJ7	8N	
5	Discriminator	6H6	6H6	7Q	
6	1st AF	6SJ7	6SJ7	8N	
7	Pwr. Output	25L6GT	25L6GT	7AC	
8	Rectifier	25Z6GT	25Z6GT	7Q	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						IDENTIFICATION CODES AND INSTALLATION NOTES
	CAP.	VOLT	PILOT PART No.	SOLAR PART No.	SPRAGUE PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	
9A	50	150	24-37	M-40-150	EL-51	AF1010D†	BR5015		▲ Filter
B	120	150		DY-8040-150	EL-123	PRS150-50†	UP6CJ44†		■ "
10	25	25	24-64	M-25-25	TA-25	PRS25-25	BR252A	TC26	Output Cath. Bypass
11	25	25	24-64	M-25-25	TA-25	PRS25-25	BR252A	TC26	Audio Cath. Bypass
12	.1	600	22-37	S-6-1	TC-1	684-.1	DT6P1	TP418	Line Bypass
13	.01	400	22-17	S-4-01	TC-11	484-01	DT4S1	TP421	Filament Bypass
14	.01	400	22-17	S-4-01	TC-11	484-01	DT4S1	TP421	" "
15	.005	600	22-11	S-6-005	TC-25	684-005	DT6D5	TP408	Output Plate Bypass
16	.01	600	22-18	S-6-01	TC-11	684-01	DT6S1	TP410	Audio Coupling
17	.05	200	22-28	S-4-05	TC-15	484-05	DT6S5	TP426	Audio Screen Bypass
18	.01	400	22-17	S-4-01	TC-11	484-01	DT6S1	TP421	Line Isolation
19	.01	600	22-50	S-6-01	TC-11	684-01	DT6S1	TP410	Audio Coupling ♯
20	.01	400	22-17	S-4-01	TC-11	484-01	DT4S1	TP421	Line Isolation
21	.003	600	22-62	S-6-003	TC-23	684-003	DT6D3	TP406	Tone Compensation
22	.01	400	22-17	S-4-01	TC-11	484-01	DT4S1	TP421	Audio Coupling
23	.01	400	22-17	S-4-01	TC-11	484-01	DT4S1	TP421	Lim. Plate Decoupling
24	.01	400	22-17	S-4-01	TC-11	484-01	DT4S1	TP421	Lim. Screen Bypass
25	.01	400	22-17	S-4-01	TC-11	484-01	DT4S1	TP421	2nd IF Screen Bypass
26	.05	400	22-30	S-4-05	TC-15	484-05	DT4S5	TP426	2nd IF Screen Bypass
27	.01	400	22-17	S-4-01	TC-11	484-01	DT4S1	TP421	2nd IF Cath. Bypass
28	.05	400	22-30	S-4-05	TC-15	484-05	DT4S5	TP426	AVC Filter
29	.01	400	22-17	S-4-01	TC-11	484-01	DT4S1	TP421	RF Bypass Pwr. Supp.
30	.01	400	22-17	S-4-01	TC-11	484-01	DT4S1	TP421	1st IF Screen Bypass
31	.01	400	22-17	S-4-01	TC-11	484-01	DT4S1	TP421	1st IF Cath. Bypass
32	.05	400	22-30	S-4-05	TC-15	484-05	DT4S5	TP426	Line Isolation
33	.01	400	22-17	S-4-01	TC-11	484-01	DT4S1	TP421	" "
34	.05	400	22-30	S-4-05	TC-15	484-05	DT4S5	TP426	Conv. Cath. Bypass SW
35	.01	400	22-17	S-4-01	TC-11	484-01	DT4S1	TP421	Conv. Plate Decoupling
36	.01	400	22-17	S-4-01	TC-11	484-01	DT4S1	TP421	Conv. Screen Bypass
37	.01	600	22-50	S-6-01	TC-11	684-01	DT6S1	TP410	Line Isolation
38	.01	400	22-17	S-4-01	TC-11	484-01	DT4S1	TP421	AVC Filter
39	5000	500	20-115	MW.5-25	1FM-25	1467-005	1D5D5	MC465	Filament Bypass
40	100	500	20-14	MO.5-31	1FM-31	1468-0001	5W5T1	MC235	" "
41	100	500	20-14	MO.5-31	1FM-31	1468-0001	5W5T1	MC235	" "
42	100	500	20-14	MO.5-31	1FM-31	1468-0001	5W5T1	MC235	" "
43	100	500	20-14	MO.5-31	1FM-31	1468-0001	5W5T1	MC235	Tone Compensation
44	100	500	20-14	MO.5-31	1FM-31	1468-0001	5W5T1	MC235	" "
45	100	500	20-14	MO.5-31	1FM-31	1468-0001	5W5T1	MC235	" "
46	100	500	20-14	MO.5-31	1FM-31	1468-0001	5W5T1	MC235	IF Bypass Disc.
47	400	500	20-121	MO.5-34	1FM-34	1468-0004	5W5T4	MC243	IF Bypass Vol. Cont.
48	100	500	20-14	MO.5-31	1FM-31	1468-0001	5W5T1	MC235	2nd IF Screen Bypass
49	150	500	20-120	MO.5-315	1FM-315	1468-00015	5W5T15	MC236	1st IF Screen Bypass
50	5000	500	20-115	MW.5-25	1FM-25	1467-0005	5W5T5	MC465	Line Isolation
51	3600	500	21-35						Fixed Padder SW
52	250	500	20-22	MO.5-325	1FM-325	1468-00025	5W5T25	MC240	Conv. Screen Bypass
53	100	500	20-14	MO.5-31	1FM-31	1468-0001	5W5T1	MC235	Osc. Grid Capacitor
54	350	500	20-137						Fixed Padder BC
55	10	500	21-36	MOS.5-41	MS-41	1469-00001	5R5Q1	MCB215	Ant. Coupling
56	35	500	20-9						Fixed Trimmer BC
57	500	500	20-30	MO.5-35	1FM-35	1468-0005	5W5T5	MC245	FM Ant.
58	100	500	20-14	MO.5-31	1FM-31	1468-0001	5W5T1	MC235	RF Coupling

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						IDENTIFICATION CODES AND INSTALLATION NOTES
	CAP.	VOLT	PILOT PART No.	SOLAR PART No.	SPRAGUE PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	
107	100	500	20-14	MO.5-31	1FM-31	1468-0001	5W5T1	MC235	Tone Compensation
108	500	500	20-30	MO.5-35	1FM-35	1468-0005	5W5T5	MC245	Line Isolation ‡

♯ Replacement must have shield.
† Parallel sections to obtain desired capacity.
‡ Not used in all models.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA				INSTALLATION NOTES
	RESISTANCE	WATTS	PILOT PART No.	MALLORY PART No.	IRC PART No.	CLAROSTAT PART No.	
59A	1 Meg.	1	36-21	TM238	D13-137X		Volume Control
B	Shaft		Not Req.	SS1	A & C3		Attach to 59A per instructions
C	Switch		" "	M26	41		" " " " "
60	500KΩ	1	37-12				Tone Control

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	PILOT PART No.	IRC PART No.	
61	150Ω	½	31-81	BW-½-150	Br.-Grn.-Br. Parasitic Suppressor
62	220KΩ	½	30-271	BTS-220K	Red-Red-Yl. AVC Network
63	220KΩ	½	30-271	BTS-220K	Red-Red-Yl. Converter Grid
64	68KΩ	½	30-268	BTS-68K	Blue-Gray-Or. Line Isolation
65	10KΩ	½	30-248	BTS-10K	Br.-Blk.-Or. Oscillator Grid
66	1000Ω	½	30-264	BTS-1000	Br.-Blk.-Red Converter Screen Dropping
67	1000Ω	½	30-264	BTS-1000	Br.-Blk.-Red Converter Plate Dropping
68	150Ω	½	31-81	BW-½-150	Br.-Grn.-Br. 1st IF Cathode
69	150Ω	½	31-81	BW-½-150	Br.-Grn.-Br. 2nd IF Cathode
70	1 Meg.	½	30-277	BTS-1 Meg.	Br.-Blk.-Grn. AVC Network
71	470KΩ	½	30-274	BTS-470K	Yl.-Vi.-Yl. Diode Load
72	15KΩ	½	30-284	BTS-15K	Br.-Grn.-Or. Bleeder
73	47KΩ	½	30-267	BTS-47K	Yl.-Vi.-Or. Limiter Screen Dropping
74	47KΩ	½	30-267	BTS-47K	Yl.-Vi.-Or. Limiter Plate Dropping
75	330KΩ	½	30-295	BTS-330K	Or.-Or.-Yl. Discriminator Diode Load
76	330KΩ	½	30-295	BTS-330K	Or.-Or.-Yl. " " "
77	47KΩ	½	30-267	BTS-47K	Yl.-Vi.-Or. Discriminator RF Filter
78	22KΩ	½	30-266	BTS-22K	Red-Red-Or. Tone Compensation
79	47KΩ	½	30-267	BTS-47K	Yl.-Vi.-Or. " "
80	3.9 Meg.	½	30-375	BTS-3.9 Meg.	Or.-White-Grn. 1st AF Grid
81	2200Ω	½	30-380	BTS-2200	Red-Red-Red 1st AF Cathode
82	1 Meg.	½	30-277	BTS-1 Meg.	Br.-Blk.-Grn. 1st AF Screen Dropping
83	220KΩ	½	30-271	BTS-220K	Red-Red-Yl. 1st AF Plate Load
84	150Ω	½	31-81	BW-½-150	Br.-Grn.-Br. Output Cathode
85	100Ω	25	31-77	DG-100	Line Dropping
86	130-130Ω	50-50			" " -See Note 1

Note 1 - Used for 220 volts operation.

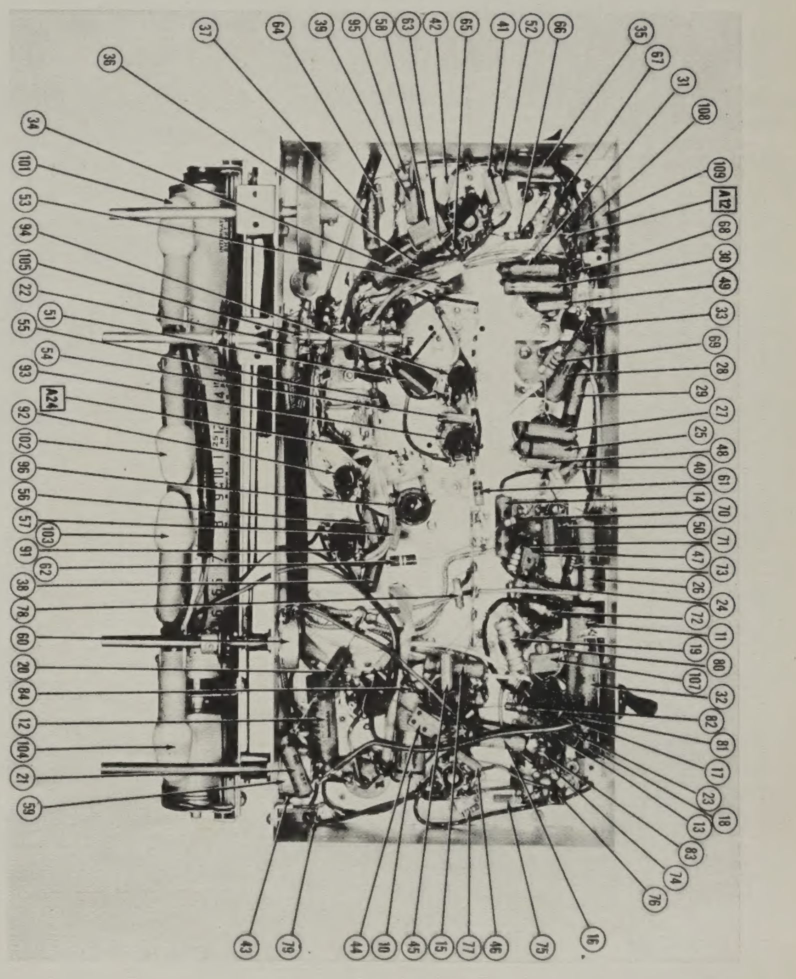
FILTER CHOKE

ITEM NO.	RATINGS			REPLACEMENT DATA			INSTALLATION NOTES
	TOTAL DIRECT CURRENT	D. C. RESISTANCE	INDUCTANCE (0 CURRENT 1000∿)	PILOT PART NO.	STANCOR PART NO.	THORDARSON PART NO.	
87	.085A	110Ω	4.5 Henries	57-9	C-2303§		§Drill one new mounting hole

TRANSFORMER (OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		PILOT PART No.	STANCOR PART No.	THORDAR'N PART No.		
	PRI.	SEC.	PRI.	SEC.					
88	2900Ω	3.8Ω	190Ω	.6Ω	Part of 41-16	A-3876	T22S45		

CHASSIS—BOTTOM VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
			PILOT PART No.	JENSEN PART No.		
89	FIELD PM	VC IMP. 3.8Ω	41-16	ST-115* Mod. P8-V		*New mounting brackets must be added.
90	CONE DIA. 7½"	VC DIA. 3/4"	NOT READILY REPLACEABLE-USE COMPLETE SPEAKER UNIT.			

R F COILS

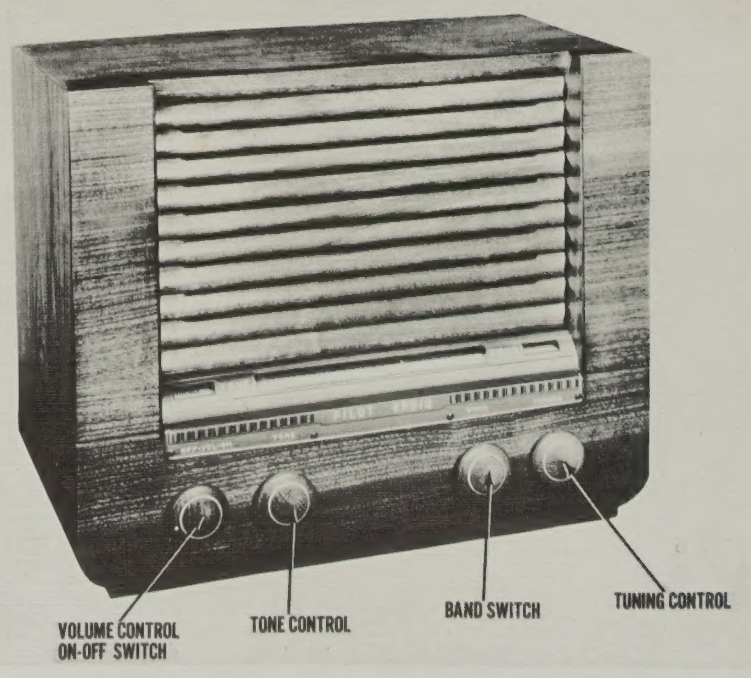
ITEM No.	USE	DC RES.		REPLACEMENT DATA		INSTALLATION NOTES
		PRI.	SEC.	PILOT PART No.	MEISSNER PART No.	
91	BC Ant. Coil	30Ω	3.9Ω	70-47		
92	SW Ant. Coil	1.5Ω	.1Ω	70-48		
93	BC Osc. Coil	.1Ω	2.5Ω	72-39		
94	SW Osc. Coil		.1Ω	72-40		
95	Osc. Cath."		1.8Ω	75-11		
96	IF Trap		30Ω	79-59		
97	Input IF	.5Ω	.5Ω	273-73		
98	Inter. IF		2Ω	273-74		
99	Output IF	2Ω	.5Ω	273-75		
100	Discriminator	.5Ω	.5Ω	30-295		

DIAL LIGHT

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA PILOT PART No.		INSTALLATION NOTES
101	Screw	110	.05				Type C-7 Frosted Glass
102	"	110	.05				" " " "
103	"	110	.05				" " " "
104	"	110	.05				" " " "

MISCELLANEOUS

ITEM No.	PART NAME	PILOT PART No.	NOTES
105	Bandswitch		
106	4-Gang Var. Cap		(10-405 MMF, 10-405 MMF, 8-28 MMF, 8-28 MMF.)



VOLTAGE READINGS

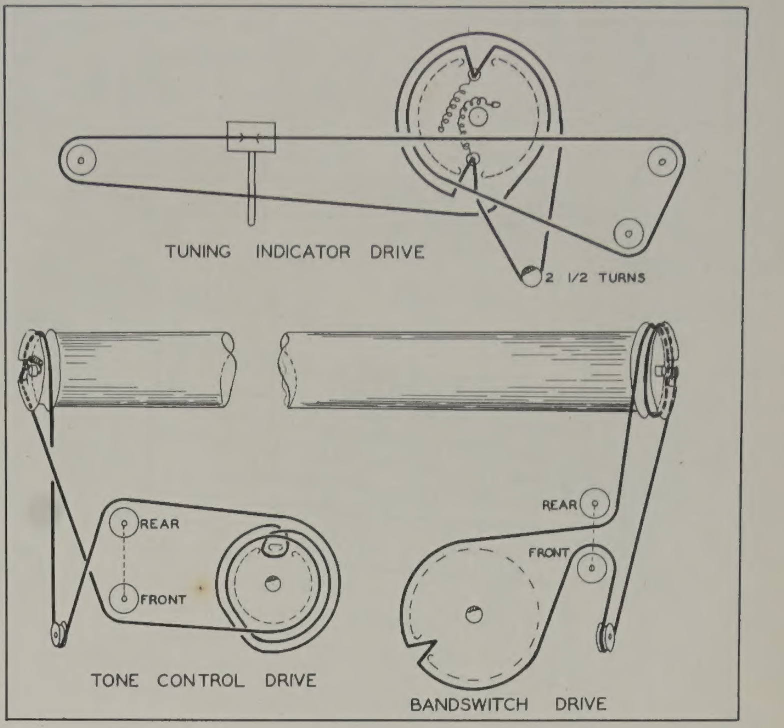
Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	6SB7Y	0V.	25 V.AC	122 V.DC	105 V.DC	-3.5 V.DC	0V.	19 V.AC	-.2 V.DC
2	6SG7	0V.	31 V.AC	1 V.DC	-.1 V.DC	1 V.DC	103 V.DC	25 V.AC	103 V.DC
3	6SG7	0V.	36 V.AC	1 V.DC	-.1 V.DC	1 V.DC	103 V.DC	31 V.AC	103 V.DC
4	6SJ7	0V.	12 V.AC	0V.	-.6 V.DC	0V.	0V.	19 V.DC	122 V.DC
5	6H6	0V.	6 V.AC	-.6 V.DC	0V.	-.6 V.DC	0V.	0V.	0V.
6	6SJ7	0V.	12 V.AC	0V.	0V.	1.2 V.DC	18 V.DC	6 V.AC	32 V.DC
7	25L6GT	0V.	52 V.AC	113 V.DC	123 V.DC	0V.	0V.	36 V.AC	8.4 V.DC
8	25Z6GT	0V.	77 V.AC	117 V.AC	132 V.DC	117 V.DC	0V.	52 V.AC	132 V.DC

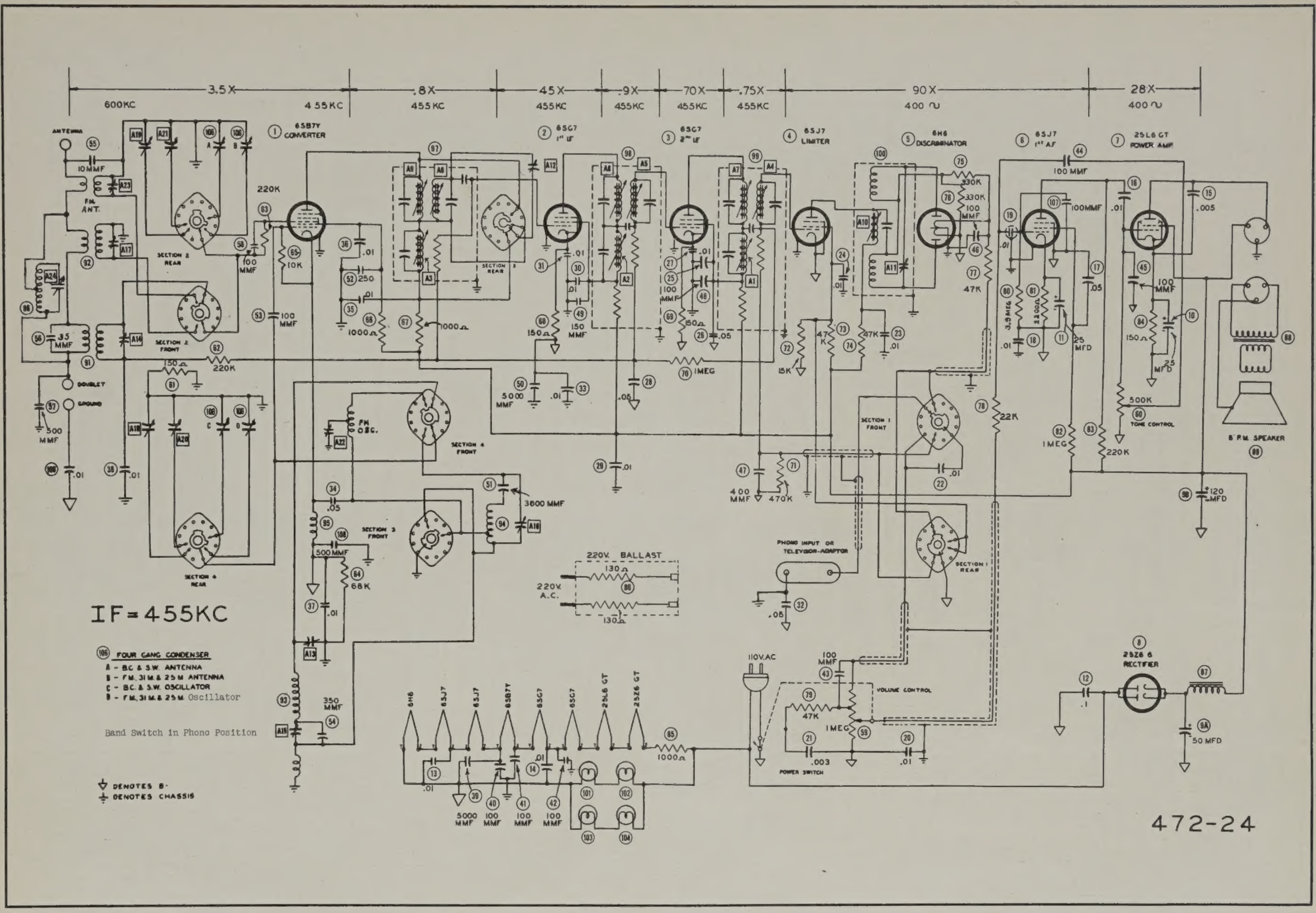
RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	6SB7Y	67KΩ	16Ω	45KΩ	45KΩ	93KΩ	1Ω	12Ω	2 MEG.
2	6SG7	67KΩ	18Ω	140Ω	1.8 MEG.	140Ω	45KΩ	16Ω	45KΩ
3	6SG7	67KΩ	21Ω	140Ω	1.8 MEG.	140Ω	45KΩ	18Ω	45KΩ
4	6SJ7	67KΩ	8Ω	0Ω	560KΩ	0Ω	0Ω	12Ω	92KΩ
5	6H6	67KΩ	4Ω	160KΩ	40KΩ	160KΩ	0Ω	0Ω	0Ω
6	6SJ7	67KΩ	8Ω	0Ω	4 MEG.	22KΩ	1 MEG.	4Ω	265KΩ
7	25L6GT	67KΩ	34Ω	45KΩ	45KΩ	460KΩ	10Ω	21Ω	140Ω
8	25Z6GT	INF.	44Ω	78Ω	45KΩ	78Ω	0Ω	34Ω	45KΩ

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

1 - DC Voltage measurements are at 20,000 ohms per volt, AC Voltages measured at 1000 ohms per volt.
2 - Socket connections are shown as bottom views.
3 - Measured values are from socket pin to common negative.
4 - Line voltage maintained at 117 volts for voltage readings.
5 - Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6 - Volume control at maximum, no signal applied for voltage measurements.





The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is shorted to B-.

PHOTOFACT* Folder

PILOT MODEL T-531AB

TRADE NAME Pilot, Model T-530 Series
MANUFACTURER Pilot Radio Corp., 37-06 36th St., Long Island City, N.Y.
TYPE SET AC-DC Operated Multiband Superheterodyne Receiver
TUBES (EIGHT) Types, 6SB7Y Converter, 6SG7 IF Amp., 6SG7 2nd IF Amp., 6SJ7 Limiter, 6H6 Discriminator, 6SJ7 1st AF Amp., 25L6GT Power Output, 25Z6GT Rectifier.
POWER SUPPLY 100-125 Volts AC-DC or 220 Volts AC-DC (with ballast)
RATING .520 Amp. @ 117 Volts AC
TUNING RANGE—BROADCAST 535-1720KC — SHORT WAVE 5.6-18.5MC, 9.353-9.795 MC, 11.241-12.419MC — FM 87.5-108.5 MC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set pointer, turn variable fully closed and set pointer at the last reference mark at the left end of the dial. Use isolation transformer if available. If not, connect capacitor in series with the low side of the signal generator and B-. Set volume control at maximum volume and keep output of signal generator no higher than is necessary to obtain output reading. For FM alignment use a 0-200 DC microammeter in series with a 100,000 ohms resistor or a 0-20 volt DC vacuum tube voltmeter and for discriminator alignment use a 50-0-50 microammeter in series with a 100,000 ohm resistor as an output indicator. Use insulated alignment screwdriver for adjusting.

DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
.1 MFD.	High side to pin #8 of 6SB7. Low side to B-.	455KC	BC	Low freq. end.	Across voice coil	A1,A2, A3	Adjust for maximum output. If isolation trans. is not used reduce dummy ant. to .001 MFD to reduce hum modulation.
.1 MFD.	"	10.7MC	FM	"	Microammeter between AVC line and B-.	A4,A5, A6,A7, A8,A9.	Short limiter screen grid (pin #6) to B-. Adjust for maximum reading then remove short.
.1 MFD.	"	"	"	"	Microammeter to junction of the two 330K resistors on disc. trans. and B-.	A10	Adjust for maximum reading.
.1 MFD.	"	"	"	"	Zero center scale microammeter to pin #6 of 6H6 and B-.	A11	Adjust for zero reading. Swing signal generator to 10.6 and 10.8 MC and record both readings. If these readings are not equal repeat last two steps and check again. It may be necessary to readjust A10 slightly to get these readings equal.
	No connection. (Signal generator off)		International SW	Tune near 10.7MC for maximum meter reading.	Microammeter to AVC line and B-.	A12	Adjust for minimum reading
200 MMF	High side to ant. post A. Low side to chassis.	1500KC	BC	150	Across voice coil	A13,A14	Adjust for maximum output in order given.
200 MMF	"	600KC	"	Tune for maximum output.	"	A15	Rock variable and adjust for maximum output. Repeat last two steps until no further improvement can be made.
400 ohms	"	18.0MC	International SW	18MC	"	A16,A17	Adjust for maximum output in order given.
400 ohms	"	9.5MC	31 Meter Band	9.5MC	"	A18,A19	"
400 ohms	"	12.0MC	25 Meter Band	12MC	"	A20,A21	"
300 ohms	"	98MC	FM	98MC	"	A22,A23	"
200 MMF	"	455KC	BC	Low freq. end	"	A24	Adjust for minimum output

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